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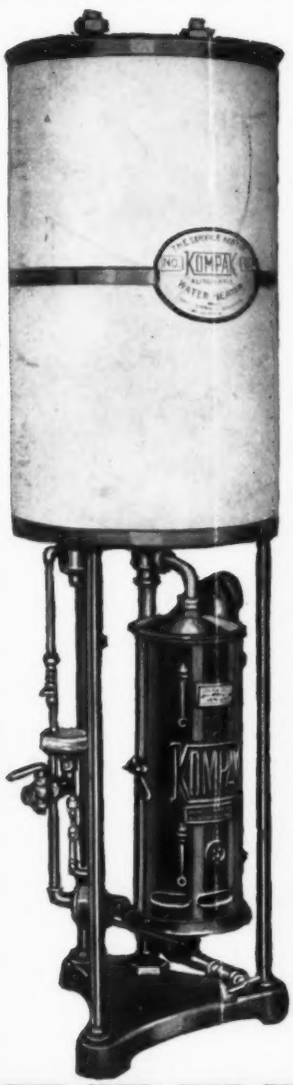

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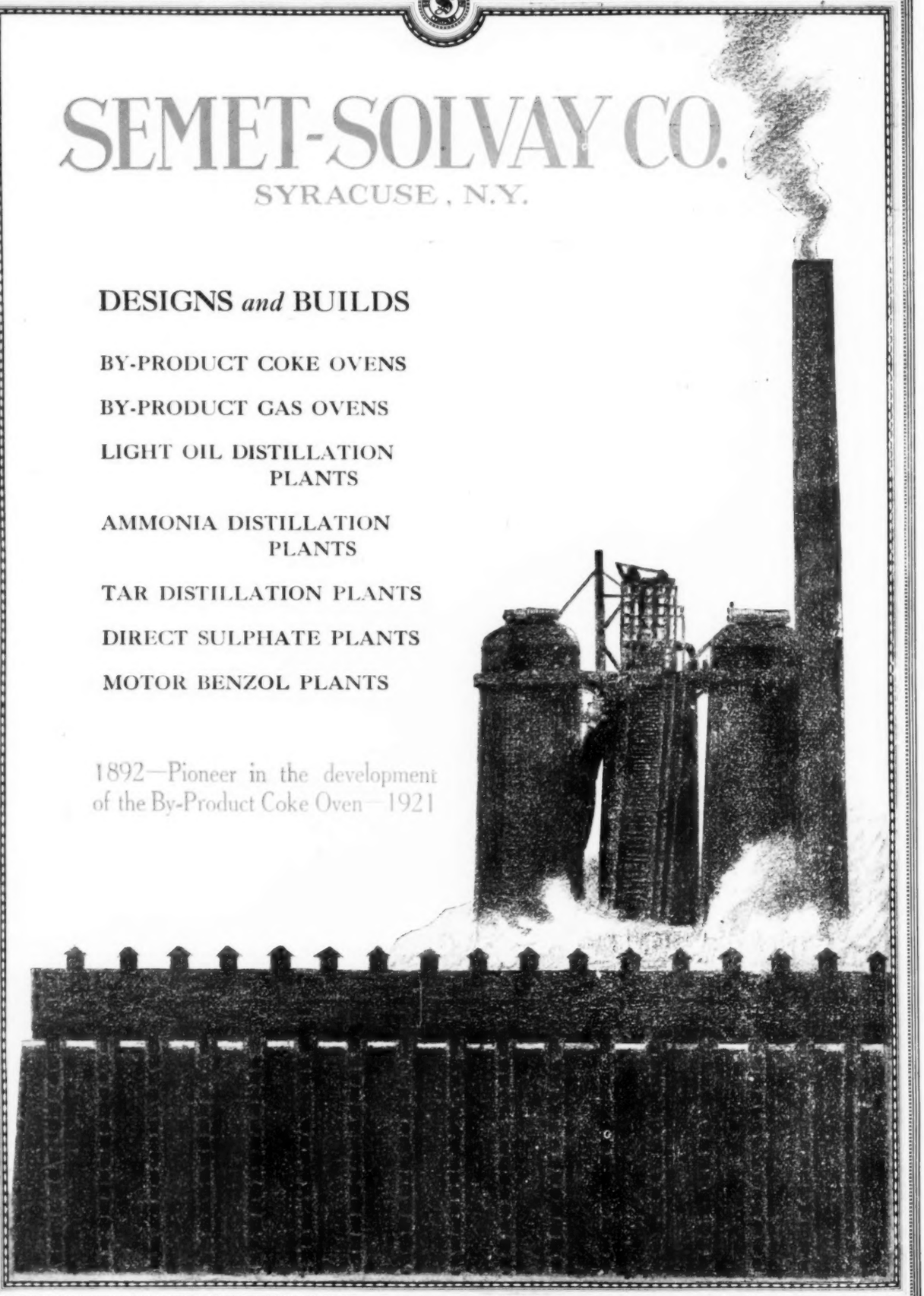

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Vol. CXIV, No. 22 NEW YORK, MAY 28, 1921 Whole No. 3299

Educational Efforts Producing Results

Attention Attracted to Compaigns That Are Being Carried On

That the tremendous educational efforts now being put forth by utility companies generally are producing results has been recently shown graphically in Indiana, where much of the consistent effort of utility executives in the past few years has been directed toward amplification of the "tell the public" campaign. Recently the Indiana Committee on Utility Information prepared a group of statements concerning utility securities from many States in the Union, the statements in the main being excerpts from various utility commissions.

This material, designed to show the investing public how secure utility investment has become under Government regulation of the utilities generally, has attracted widest attention in Indiana and surrounding States. Recently one of the largest bonding companies in Indianapolis "lifted" the group of statements bodily and utilized it in an advertisement which did not have for its purpose the exploitation of a single offering of the company. It was just done for good-will purposes in the investment field generally.

The advertisement attracted the attention of utility experts, financial executives and the general public. The Fletcher American Company published the advertisement. George C. Forrey, vice-president of the company, immediately was made the target of congratulatory messages from all over the city of Indianapolis and elsewhere. The advertisement is worth reprinting in the JOURNAL as an example of how utilities of Indiana gradually are edging their way into a closer understanding and a more direct co-operation with the banking houses of the State. It follows:

"PUBLIC UTILITY SECURITIES

"Public utility securities are rapidly gaining favor with conservative investors. This is based largely upon the broad and constructive position taken by the various State commissioners. The following recent quotations from various commissions will be of interest:

"Pennsylvania: 'The public interest demands a solvent utility, rendering adequate service at a reasonable rate, rather than a utility struggling against bankruptcy and furnishing only mediocre service because its rates are too low.'

"New York: 'It is far better for a community to yield a slightly larger return to the company than it may be exactly entitled to, in order that it may remain prosperous and furnish the service which the public should have and be a credit to that community rather than to have a corporation in financial distress because those whom it serves are unwilling to allow it to have a liberal remuneration for its service.'

"Indiana: 'To obtain this money at reasonable rates, public utilities must have credit which will attract the investor's discernment. It cannot be emphasized too strongly that the establishment of such credit is really of more vital concern to the communities served than to the utilities serving them.'

"California: 'The rates established . . . are intended to provide applicant with sufficient revenue to properly meet the operating expenses of its electric business, to set aside a proper depreciation reserve and to yield it a fair return upon the value of its electric properties.'

"Nebraska: 'It is a matter of common knowledge that, owing principally to the world war, costs of labor and supplies of every kind have greatly advanced since the ordinance was adopted and largely since this cause was last heard in the court below. And it is equally well known that annual returns upon capital and enterprise the world over have materially increased, so that what would have been a proper rate of return for capital invested in gas plants and similar public utilities a few years ago furnishes no safe criterion for the present or for the future.'

"Massachusetts: 'The companies are entitled as a matter of right, and for that matter in the public in-

Building good-will among its consumers is one of the biggest tasks that confronts a gas company. There have been many efforts along this line and it is always a source of satisfaction to know that the work is accomplishing its desired ends. This story is a tale of results.—Editor.

terest, to such readjustments in prices as will enable them to perform adequately and efficiently the essential service which they have undertaken . . . The companies cannot control the market for their essential supplies, and the prices paid in the exercise of their best judgment are a fair charge to the consumer.'

"Arizona: 'We do not believe that it was intended that the regulatory powers vested in this commission should be used to the disadvantage or inequity of the public utilities of the State, and we believe we can render a greater service to the citizenship by giving rates which, while they are just and reasonable to the public, will enable the company to maintain a standard of service fully equal to the public necessities and provide for extensions of service which will encourage rather than retard the growth and development of the State.'

"Illinois: 'Besides the cost of money, which varies with the prices of other commodities, it appears reasonable to reward management of a public utility enterprise in proportion to results achieved, a proportion based upon sound business principles and economic laws, and a principle that has heretofore been recognized by this commission.'

"New Jersey: 'To attract new capital to a utility it is, in my opinion, essential that the purchasing power of the present return should be commensurate with the purchasing power of the fair return which attracted capital to the utility originally.'

"Montana: 'Despite abundant power, no one else seems willing to undertake the hazard of developing it, and those who have made the risk are entitled, as a minimum, to a fair return upon their investment.'

"Wisconsin: 'We believe the company should be placed in a position to obtain the necessary additional capital by earning a fair return.'

"Michigan: 'The Michigan Public Utilities Commission is alive to the fact that there is a great demand for the extension of public utilities in the State. The State cannot grow properly unless the public utilities are permitted to grow at the same time. According to our best information, there is a public demand in Michigan to-day for the investment of over $100,000,000 in extensions of gas, electric, telephone and street railway utilities. The cost of the getting of that money is a proper part of the cost of utilities service. If rates of interest and rates of return upon industrial enterprises are generally 7 or 8 or 9 or 10 per cent, then the rates of return upon public utility capital should, if adequate service is given, be about the same.'

"Ohio: 'Having determined the value of the property used and useful in furnishing the service and what sum must be realized to pay operating expenses, depreciation reserve, return on the investment, and the like, the object of regulation is to see that the rates are so adjusted as to yield that sum.'

"FLETCHER AMERICAN COMPANY
"Second Floor Fletcher American National Bank Bldg.
"INDIANAPOLIS"

Coincidentally with the printing of this ad, it became known that leaders of the utility group in Indiana have been discussing thoroughly the possibilities of some concerted move to bring the financial interests of the State into more direct co-operation with the utility field generally. At the present time the average investment house in Indiana handles relatively a small volume of utility securities when compared with the vast financial fabric of Federal, State, municipal, foreign and other industrial securities which have flooded the markets in the past few years. If the small volume of utility securities can be increased it will mean much more opportunity for broadening of the general utility field.

Discussing these phases of the utility securities situation to-day Mr. Forrey says for the JOURNAL:

"The public attitude toward utilities is very different from that of 1914. The public has come to realize the inseparable importance of the individual and communal welfare of electric light, gas, power and electrical railway transportation. Moderate increases in service rates have been contracted, with doubled and tripled prices for other necessities. Disappointing results from Government railroad operation have been compared with continued efficiency by the privately owned utilities. The result has been a much fatter public sentiment and a strengthening of the hands of State and municipal bodies in granting equitable rates to the companies.

"A striking phase of public utility development of the last few years lies in bringing the public and the utilities closer together through what is known as the customer-ownership movement. A large number of progressive companies have invited their customers to become profit-sharing partners in the business, offering as a rule their preferred stocks for cash investment or on a partial-payment basis. The response of the public has been surprising. Customer-ownership is growing to be of the greatest value in improving the public relations status of the service organizations. It means popular ownership with retention of the virtues of private operation and responsibility. No more satisfactory result than this can obtain under any other condition that would give proper service."

Mr. Forrey's statement touched on a phase of utility development that has just been tried out effectively in Indiana by the Interstate Public Service Company, which operates some sixty utilities now in some twenty-five cities of the State. Harry Reid, president of the Interstate (which is one of the properties of the Insull group in Chicago), some time ago developed the idea of selling securities of his company directly to the customers of his utilities. The plan was placed in effect on his interurban line between Indianapolis and Louisville, and almost instantaneously became a success.

Placing Stock With Consumers

Station agents and other employees of the company, dealing directly with the daily customers of the line, placed approximately half a million dollars in preferred stock with these customers. This did two things: it served to help finance the company, and—far more important—it made individuals, who were placed strategically in the populations which the traction company served, partners in the ownership of the property. Goodwill developed from this seed by leaps and bounds. The individual stories exemplifying the growth of this goodwill are numerous, and all bring out the complete practicability of this method of marketing utility securities. A similar situation existed in Indiana; of course relating to the Citizens Gas Company, which recently was granted an increase in rates from 60 cents to 90 cents a thousand cubic feet by the Indiana Public Service Commission. When the Citizens company was first organized some 1,200 potential patrons of the company purchased stock therein.

Other utilities throughout Indiana and surrounding

(*Continued on page 470.*)

Technical Section, A. G. A., Making Headway

Work of Division Is Being Rapidly Carried Forward

The following report of the activities of the technical section of the American Gas Association has just been made public:

At the meeting of the managing committee held at association headquarters January 25, good progress was reported in the work of the various committees appointed.

In order to facilitate its supervision, R. B. Harper, chairman of the section, has divided the work into five divisions: Production, distribution, chemical, by-products and publications, and a divisional chairman has been placed at the head of each division.

The following committees have been organized and are at work in each division.

Production Division

H. R. Cook, Jr., chairman, Baltimore, Md.

Work of Carbonization Committee

A study and report of recent developments in all types of carbonization equipment and methods of operation.

The reporting of statistics on the comparative efficiencies of different types of coal gas plants and mixed coal and water gas plants.

Low temperature carbonization.

Work of Committee on Complete Gasification of Coal

A study and report of the estimated total heating values, compositions, specific gravities, casts in holder, etc., of the gas produced by the complete gasification of various high and low grade coals in various types of plants.

Collection and study of operating results cost data, etc., of existing straight blue water gas and low temperature carbonizing plants and of plants in which the charges are steamed or other methods are employed for the production of lower heating value gases than are usually made elsewhere.

A study and report of the estimated costs of gas in the holder for gases of various total heating values, including those most economically produced in each of different types of plants under various conditions.

An estimation and report, based upon the foregoing studies and work, of the compositions, total heating values, specific gravities, etc., of gases which might be most economically produced in various types of plants under average conditions.

Work of Committee on Disposal of Water from Gas Plants

A study of new methods in the disposal of wastes from coal gas plants.

Action as an advisory committee on all questions or matters of the disposal of wastes from gas plants which may be referred to the committee.

Standardization of tar separators for coal and water gas plants.

This report of the progress of the technical section shows how splendidly the American Gas Association is attacking the problems of the industry. And incidentally it is one of the best arguments that could be advanced to companies that are not members as a reason for joining. If your company is not a member, why not?—Editor.

Work of Gas Oil Committee

A report of new data concerning the available supply of crude oils in the United States and Mexico.

A report of the various quantities of oils available for gas making purposes.

A report of the use of heavy oils and their effects upon the capacities and efficiencies of the present types of carbureted water gas apparatus.

Work of Refractory Materials Committee

General study and report of the values of various refractory materials, such as carbofrax, chromite, magnesite superfrax, sirconite, mica schist and silicon carbide, for use as linings in water gas generators.

Co-operative work on refractories with committee C-8 of the American Society for Testing Materials and refractory committee of the Refractory Manufacturers' Association.

Distribution Division

G. I. Vincent, chairman, Syracuse, N. Y.

Work of Cast Iron Pipe Standards Committee

General observance of the use and values of the cast iron pipe standards already adopted and consideration of any suggested or proposed changes in such standards already adopted and consideration of any suggested or proposed changes in such standards

or specifications for cast iron pipe or special castings.

A study and report on the results obtained where installations have been made of the new type of "B" bell with cement joints.

Work of Consumers' Meters Committee

A study and report of a nomenclature or system of rating consumers' meters on the basis of their capacities instead of "light sizes," as is usually done at present.

Action as an advisory committee on any questions or matters arising in connection with the meter testing routine, other work or recommendations made by the 1919-1920 committee on consumers' meters.

Suggest reduction of number and variety of sizes of meters used to some tentative list of standards.

Work of Committee on Increasing Distribution Capacity

A study and report of the estimated costs involved in the improvement of each of various types of existing distribution systems in order to most economically and satisfactorily, for company and consumer, distribute greater volumes of various gases in accordance with various increased consumptions by 10 per cent increments up to 100 per cent increase over the existing demand.

A study and report of the existing and proposed distribution equipment and methods with an object of setting forth the various distribution practices now existing and attempting to improve and standardize same where possible.

Allowable pressure variations.

Work of Electrolysis Committee

Co-operation with the American committee on electrolysis and others upon electrolysis questions and investigations affecting the gas industry.

Action as an advisory committee upon electrolysis questions.

Chemical Division

W. H. Fulweiler, chairman, Philadelphia, Pa.

Work of Chemical Committee

Determination of a plan for the distribution of special samples of materials, used in the gas industry, to various laboratories for the purpose of testing them by the proposed methods given in the revised edition of the Gas Chemists' Handbook.

Action as an advisory committee on all chemical questions which may be referred to it.

Preparation of articles on developed or standardized test methods for publication in the A. G. A. Monthly.

Survey of present laboratory facilities adaptable for research of interest to the industry.

Work of Gas Coal Specifications Committee

A study and report of specifications for coals intended for the production of gas.

Co-operation with the subcommittee on specifications for gas coal of committee D-5 on coal, of the American Society for Testing Materials.

Work of Gas Pipe and Meter Deposits

Continuation of investigations concerning the nature and prevention of deposits in pipes and meters started by the 1919-1920 committee on dust and sulphur deposits, etc., in meters and services.

Work of Purification Committee

A study and report of the compositions, characteristics, best methods of determination, etc., of the sulphur bearing constituents of gases produced and distributed for use in cities and towns.

Bibliography and review of the literature on the above

Continuation of the researches and work on the subjects of hydration and alkalinity and determination of the latter in both coal and water gas, and report of the results of such work.

A study and report of what has been done and is being done upon the subject of liquid purification.

Trials of test methods proposed by 1919-1920 committee on purification.

Distinction between activity and capacity of oxide.

Publications Division

G. T. Macbeth, chairman, Mt. Vernon, N. Y.

Work of Nomenclature Committee

Completion of a glossary of technical words, terms and phrases used in the gas industry.

By-Products Division

C. C. Tutwiler, chairman, West Conshohocken, Pa.

The work of this division will be carried forward through the preparation of three papers along the following lines:

A paper aiming to show that it would be to the best interests of all concerned to have the gas industry keep out of the by-product refining business.

A paper from some company engaged in the manufacture of gas that thinks it would be to the best interest to take up the subject of refining by-products.

A paper from some company engaged in the manufacture of gas that thinks it would not be to the best interests of the company to take up the refining of its by-products but does think it should make a study and better preparation of its by-products for the existing outside market.

Much of the research work planned will require more than a year for its completion and the managing committee realizes that it will probably be impossible to present the above program in its entirety in the time available at the convention. The research will be carried forward, however, and whatever is not included in the convention program will be presented to the members through the A. G. A. Monthly and the trade journals

Next Week

There are so many good things scheduled for the next issue of the AMERICAN GAS JOURNAL that it is impossible to enumerate them here. But we can say that salesmen will find more good ideas on selling appliances than have ever been published. And that is saying a good deal when the previous merchandising issues of the JOURNAL are considered.

Adapting Electrical Cleaning to Blast Furnace Gases*

MAY 31 1921 SMITHSONIAN DEPOSIT

A Discussion of This Problem by an Authority

By N. H. GELLERT
President, Gellert Engineering Company

The general gas cleaning problem, including that of other gases besides those that issue from a blast furnace, may be split into two parts:

The cleaning of non-combustible gases, and
The cleaning of combustible gases.

Non-combustible gases usually issue from furnaces or stacks in which gas either has been utilized for combustion purposes, or the non-combustible gases are driven off by heat primarily as inert gases.

In the copper smelting industry, non-combustible gases are the products that issue from the stack. The purpose of cleaning such gases is, as a rule, twofold:

The dirt in the gas very often is a nuisance to the surrounding country. This is very evident in various localities in the West, where in the past, the gas containing poisonous materials, has deposited dust over large areas of land and made it useless for agricultural or grazing purposes.

The products or particles that are present in the gases often have a real value. It is desirable in such a case to recover these products irrespective of their nuisance qualities.

A case in point again is the smelter industry. Gases issuing from these smelters are rich in metallic content and in their by-products and present a profitable field for the cleaning of gases. As a matter of fact, one of the largest, if not the largest, installation of Cottrell electrical precipitators is at a copper smelter where in two-stage treatment copper is recovered in metallic form and arsenic is recovered in nearly pure state. In the cement industry, the cleaning of gases is being inspired, not so much by the monetary value of the products recovered, but more by the necessity of eliminating nuisances.

Anyone who is familiar with the locality of a cement mill can readily visualize the thick white coating of cement dust which eventually overfertilizes the surrounding farm lands and causes a great deal of destruction to plant life.

During the war, however, the incentive to clean gases for their valuable by-products was also present since cement flue dust has a potash content that makes it valuable as a fertilizer. With potash selling as high as $6 per ton, even for low-grade material, the recovery of this flue dust became a very interesting matter. In fact, one cement mill using the electrical system of recovery of cement flue dust operated the mill only when the cleaners were working well, as the profits received from the sale of potash in the cement flue dust were greater than the profits received in the manufacture of cement. With the end of the war, however, and the influx of foreign potash, the cement industry could no longer have this incentive to potash recovery. It is cleaning its gases practically for the elimination of a nuisance.

The statements that are made here by Mr. Gellert, unlike near-beer, which "ain't got no authority," carry with them real weight, for they are expressed by a man who is recognized as being among the foremost in his profession. The "Journal" is glad to offer this story to its readers.—Editor.

The second part of the general problem of cleaning gases is the problem of cleaning combustible gases. These include gases used for industrial purposes, manufactured in producers, in coal gas and water gas plants, and also include the gases issuing from the blast furnace.

In a previous paper the fact was brought out that the blast furnace was, in addition to an instrument for the conversion of iron ore to metallic iron, a gas producer on an enormous scale since practically 50 per cent of the coke issuing from the top of a blast furnace is in the form of a combustible gas.

Blast Furnace Gas Problem

The problem of cleaning gases issuing from a blast furnace has never been a simple one. There have been continual attempts at improvements ever since the blast furnace was first put into operation and these attempts have resulted in better and better cleaning apparatus as time has gone by. Various methods of cleaning gases have been discussed so thoroughly in papers which have been read in the past before technical societies, interested in this general subject, that there is no need of reviewing this subject again at this time. However, what must be of interest to everybody concerned in the blast furnace industry is the method of attack and the adaptation of various processes of cleaning to blast furnace gases.

It is, of course, essential in the very beginning, to know the condition of the blast furnace gas before

*Paper read before Cleveland section of the Association of Iron and Steel Electrical Engineers.

there can be any intelligent attempt to clean the dust and fume from the gas. In general, blast furnace gases contain from two to ten grains of dust per cubic foot of gas at standard conditions of temperature and pressure, namely 62 deg. Fahr. and 29.92 in. Hg. which is atmospheric pressure. This dust exists in the form of both dust and fume. The fume is so finely subdivided, however, that in a great many respects it acts as a perfect gas.

In order to determine how to apply a cleaner to the blast furnace gas, there are at least four things which must be investigated.

1. Temperature.
2. Velocity and volume.
3. Dust content.
4. Moisture content.

It is very evident that since the measurements are made under the most difficult conditions, usually out in the open air and under a varying condition of load with variations in temperature, velocities, dust content and moisture content, the data must be taken over a long period of time in order to make them of any real value. In addition, there are inaccuracies to be encountered in the actual measurements due to the fact that it is not as a rule possible to take these measurements under the conditions necessary for extreme accuracy. Nevertheless, the measurements obtained give sufficient information to make it possible for a blast furnace operator to get a fairly good indication of what he is doing and how to correct any conditions that need correction.

Determination of Velocity and Volume of Gas

The equipment necessary to make a volume determination as a rule, is a Pitot tube, of a standard type, a manometer tube, rubber tubing, some boards and nails, measuring rule and a few tools. A gas measuring station location should be selected in the gas main where the most uniform gas flow conditions are approximated. The conditions are always adversely affected by bends, connections, offtakes, explosion doors, manholes, etc. It is seldom that a station can be selected in blast furnace gas main systems which will give the ideal flow conditions assumed in theoretical discussions. If a straight portion of main can be found, four to ten times the diameter, in length and without valves, offtakes or some other interfering object, the conditions may be assumed to be good for gas measurements.

After this station has been located, it is necessary to determine the inside dimensions of the main in which the flow of gas is to be measured. If the main is horizontal, care should be used in sounding the inside bottom of the main for any deposits of flue dust which may reduce the total cross sectional area. The area of the circular main should then be calculated. The velocity of the gas flowing through the main is greater at the center than near the walls. Therefore, to get the average gas velocity it is necessary to take a large number of velocity readings across one or preferably two diameters of the main. By dividing the main into equal areas, it is possible to get the average main velocity in the simplest way and with the least expenditure of time. The average velocity of the total gas flow will be the average of the velocities obtained at the mean velocity points of the equal area zones.

Table No. 1—Ten-Area Percentage Table

Diameter and radii of concentric rings for equal areas.
Mean velocity points located both as radii percentages and percentage distance from side of pipe.
Areas numbered out from center.
Inside diameter of pipe equals 100 per cent.

			Mean Velocity Point		
		Radii as Percentage of Pipe Diameter	Radii as Percentage of Pipe Diameter	Distance From One Side Diameter	
Area	Diameter Per Cent	Per Cent	Per Cent	Per Cent	In.
1	31.6	15.8	11.2	38.8	61.2
2	44.7	22.3	19.4	30.6	69.4
3	54.7	27.4	25.0	25.0	75.0
4	63.2	31.6	29.6	20.4	79.6
5	70.7	35.35	33.5	16.5	83.5
6	77.5	38.7	37.1	12.9	87.1
7	83.7	41.8	40.3	9.7	90.3
8	89.4	44.7	43.3	6.7	93.3
9	94.9	47.4	46.1	3.9	96.1
10	100.0	50.0	48.7	1.3	98.7

Table No. 2—Five-Area Percentage Table

Diameter and radii of concentric rings for equal areas.
Mean velocity points located both as radii percentages and percentages distance from side of pipe.
Areas numbered out from center.
Inside diameter equals 100 per cent.

			Mean Velocity Point		
		Radii as Percentage of Pipe Diameter	Radii as Percentage of Pipe Diameter	Distance From One Side Diameter	
Area	Diameter Per Cent	Per Cent	Per Cent	Per Cent	In.
1	44.7	22.4	15.8	34.2	65.8
2	63.2	31.6	27.4	22.6	77.4
3	77.5	38.7	35.4	14.7	85.3
4	89.4	44.7	41.8	8.2	91.8
5	100.0	50.0	47.4	2.6	97.4

Table No. 3—Table for Converting Gas Volume at 32 Deg. Fahr. to Gas Volume at any Temperature Fahrenheit Up to 1,200 Deg.

Temp. t	Factor f	Temp. t	Factor f	Temp. t	Factor f
32 deg.	1.00	410	1.77	790	2.54
40	1.02	420	1.79	800	2.56
50	1.04	430	1.81	810	2.59
60	1.06	440	1.83	820	2.61
70	1.08	450	1.85	830	2.63
80	1.10	460	1.87	840	2.67
90	1.12	470	1.89	850	2.69
100	1.14	480	1.91	860	2.71
110	1.16	490	1.93	870	2.73
120	1.18	500	1.95	880	2.75
130	1.20	510	1.97	890	2.77
140	1.22	520	1.99	900	2.79
150	1.24	530	2.01	910	2.81
160	1.26	540	2.03	920	2.83
170	1.28	550	2.06	930	2.85
180	1.30	560	2.08	940	2.87

190	1.32	570	2.10	950	2.89
200	1.34	580	2.12	960	2.91
210	1.36	590	2.14	970	2.93
220	1.38	600	2.16	980	2.95
230	1.40	610	2.18	990	2.97
240	1.42	620	2.20	1,000	2.99
250	1.44	630	2.22	1,010	3.01
260	1.46	640	2.24	1,020	3.03
270	1.48	650	2.26	1,030	3.05
280	1.50	660	2.28	1,040	3.07
290	1.52	670	2.30	1,050	3.09
300	1.54	680	2.32	1,060	3.11
310	1.56	690	2.34	1,070	3.13
320	1.58	700	2.36	1,080	3.15
330	1.60	710	2.38	1,090	3.17
340	1.62	720	2.40	1,100	3.19
350	1.65	730	2.42	1,110	3.21
360	1.67	740	2.44	1,120	3.23
370	1.69	750	2.46	1,130	3.25
380	1.71	760	2.48	1,140	3.27
390	1.73	770	2.50	1,150	3.29
400	1.75	780	2.52	1,160	3.31
				1,170	3.33
				1,180	3.35
				1,190	3.37
				1,200	

Under normal conditions of blast furnace operation, the following simple formula which has been used with sufficient accuracy for air measurements will be found to apply without appreciable error to blast furnace gases.

V equals 2.9 × /TH.
V equals the gas velocity in feet per second.
T equals temperature in degrees Fahr. (t) plus 460 (more closely 459.6).
H equals velocity head in inches of water.

Whenever making a dust determination, as in the velocity and volume determination, the same care should be exercised in seeing that the point of sampling is not too close to a bend as the possibility of getting erroneous data will then exist. There are two usual methods of making dust extraction tests. With both, satisfactory results may be obtained One method is that which uses the simple extraction apparatus and the other uses the balanced filtration tube.

Moisture Determination

But the velocity, volume and dust content of the gases are not all that it is necessary for the operator to know. The moisture content of the gas plays a most important part both in regard to the actual utilization of the gas and also in regard to the correct measurements of the gases. Due to the high temperatures found in blast furnace gases, it is impossible to use with any accuracy any hydrometric apparatus for moisture determination.

Moisture in a vapor form occupies space in addition to that occupied by the gas. Two gases or vapors cannot occupy the same space. If, therefore, moisture in the vapor form is added to a gas, a greater volume of resulting mixture will take place. The inaccuracy due to overlooking this moisture correction may readily amount to 7 per cent in gases having but a moderate moisture content and to 20 per cent in gases having a fairly high moisture content. Such inaccuracies may lead to serious consequences when the volumetric capacity of a proposed gas treating apparatus is based upon gas measurements made at meter conditions without proper moisture corrections. Furthermore, statements of the dust content per cubic foot of gas at main conditions will be in error unless proper moisture corrections are made to the gas as measured at meter conditions.

There have been two methods developed for determining the vapor volume and the resulting volume of the gas mixture. The details of these will not be gone into but the formula resulting from one of these methods will be given. These two methods check within 10 per cent of one another as far as moisture content is concerned; they check within less than 1 per cent for totals of gas and moisture.

The formula is as follows:

$$Vf = Vw \times \frac{Vs}{Ts} \times Tf + Vm \times \frac{Tf}{Tm} \times \frac{Pm}{Pf}$$

Where:
Vf equals volume of gas at main conditions in cu. ft.
Vw equals volume of vapor at main conditions in cu. ft.
Vm equals volume of dry gas constituent at meter conditions in cu. ft.
Tf equals absolute temperature of the gas at main conditions equals 459.6 plus temp. of gas at main temperature in deg. Fahr.
Tm equals absolute temperature of gas at meter.
Ts equals absolute temperature of the saturated vapor or steam at the pressure of gas main.
Pm equals absolute pressure of meter in in. Hg equals B—Pm if pressure is negative.
Pf equals absolute pressure of gas main or flue—equals B plus Pf×0.0735 if pressure is positive.
Pf equals absolute pressure in inches of water in flue or main.
B when standard is 29.92 in. Hg.
Vg equals the volume of dry gas constituent at main or flue conditions in cu. ft.

Table No. 4—Value of Vs/Ts

Vs based on 1,000 grams of saturated steam.
Ts based on absolute temperature at saturation/pressure in pounds absolute.

Absolute Pressure Lbs. Sq. In.	Saturation Temp. Deg. Fahr.	Vs/Ts	Pressure Lbs. Sq. In.	Saturation Temp. Deg. Fahr.	Vs/Ts
10	193.2	0.1300	23	235.5	0.0560
11	197.8	0.1179	24	237.8	0.0533
12	202.0	0.1081	25	240.1	0.0515
13	205.9	0.0995	26	242.2	0.0495
14	209.6	0.0925	27	244.4	0.0476
15	213.0	0.0863	28	246.4	0.0458
16	216.3	0.08075	29	248.4	0.0442
17	219.4	0.0760	30	250.4	0.0427
18	222.4	0.0718	31	252.3	0.0413
19	225.2	0.0680	32	254.1	0.0400
20	228.0	0.06435	33	255.8	0.0388
21	230.6	0.0613	34	257.6	0.0377
22	253.1	0.05845	35	259.3	0.0365

(*Continued on page* 473.)

Conservation of Natural Gas Urged

Expert Would Fix Price High Enough to Insure Saving

Asserting that he is an earnest advocate of a price for natural gas which will make its conservation worth while to the producer, distributer and consumer, H. Foster Bain, Director of the United States Bureau of Mines, told members of the Natural Gas Association of America at the annual convention that the only way he knew by which this end could be achieved would be by strict co-operation among producers and distributers, and by economical use by consumers.

Mr. Bain spoke in place of A. B. Fall, Secretary of the Interior, who was scheduled to deliver the address before the delegates to the sixteenth annual convention of the association at their annual banquet. Mr. Fall was unable to be present owing to an unexpected calling of a Cabinet meeting in Washington. He, however, telegraphed his regrets and well-wishes.

Nearly 2,000 delegates attended the banquet, the room for which was elaborately decorated. Among those present were A. B. Leach, who acted as toastmaster; James P. Goodrich, ex-Governor of Indiana, and Harvey C. Smith, Secretary of State of Ohio, who also made short talks.

Mr. Bain called attention to a period many years ago when little or no attention was paid to the product about which he was speaking. Comparing that period to the present, he said:

"Natural gas is no longer a by-product, but ranks as one of the most essential fuels known at the present time. You gentlemen are associated in a service that renders comfort to millions of people; a service that is fundamental to our national life, for it serves the home, the backbone of the nation.

"Statistics show that gas production reached its probable maximum during 1917. According to that, it is now on the decline and the supply will be exhausted completely within a few years unless steps to prevent this calamity are taken."

He said that it is absolutely essential that the business should continue and that the number of years that it will continue "is dependent largely upon the men in this room and the companies represented."

Many Doubt Limitation of Supply

Because so many people apparently doubt that the available supply of this commodity is so limited, according to Mr. Bain, he urged that the gas companies get together and engage some impartial agency to investigate just how much is available, the information obtained to be furnished to the public. He also urged that it be demonstrated to public utility bodies that a great mistake had been made in holding gas at such a low rate, thereby encouraging waste.

In order to remedy defects the companies must furnish much money, but in return they must be paid more for their product. In this connection it is interesting to note that the average price of manufactured gas in the United States is about $1.20 for each 1,000 cu. ft., while until recently only 40 cents was being paid for the natural product in Oklahoma. The natural product also has twice the fuel value of the manufactured gas.

Referring to a proposal that all natural gas be reserved for domestic use, he said:

"During the winter months this plan possibly would work—that is, during the time that the peak load is on. On the other hand, it is during the other season that the industrial plants afford a steady income to the producers because their consumption is fairly constant the year round."

The result of following this course, he explained, would be that domestic consumers would have to pay a much higher rate.

Citing what he said was one of the largest examples of wastage on record, he referred to the Cushing Pool oil field in Oklahoma, where, he said, 250,000,000,000 cu. ft. were wasted in three years. The largest wastage throughout the country was attributed by him to the oil fields, which, he said, of late years have found means whereby much of the waste has been eliminated.

30 to 35 Per Cent Lost

Quoting Samuel S. Wyer as authority for a statement that 30 to 35 per cent of gas started from a well is lost before it reaches the meter, he said that, according to this figure, heat energy from only 13 per cent of the gas starting from the well is realized by consumers "using an ordinary old-style gas range." Eighty per cent of the gas passing through the consumer's meter in this type of stove is wasted, he said.

In conclusion Mr. Bain said:

"The time for turning from natural gas to manufactured gas will come inevitably, but it is your responsibility; but I believe that by co-operation, each with the other, of the public and the public's agents, and by the conservation of natural gas in its production, distribution and utilization, you can postpone this inevitable change for many years."

Several thousand citizens of Greater Cincinnati, in addition to more than 2,000 members of the Natural Gas Association of America, attended the opening of its sixteenth annual convention.

The morning session was devoted to talks by experts on subjects of interest and to receiving the reports of the committee on uniform accounting, submitted by George W. Ratcliff, of Pittsburgh, chairman, and the report of the joint committee on electrolysis, by F. M. Towl, of New York City.

Owing to the illness of H. L. Montgomery, general manager of the Empire Gas & Fuel Company, Bartlesville, Okla., who was scheduled to discuss an article written by him explaining a three-part gas rate, this proposition was explained by T. J. Strickler, assistant general manager of the concern.

The subject of Mr. Strickler's talk was "Effect of Rate on Service." He exhibited a meter which he explained could be set so that only a certain amount of gas could pass through it each hour and the amount passing through would have a pressure governed by the manner in which the meter was set.

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Dr. Edward Bennett Rosa

Dr. Edward Bennett Rosa, chief physicist of the Bureau of Standards, Washington, D. C., died suddenly in his office at the Bureau Tuesday afternoon, May 17. Dr. Rosa was born in Rogersville, N. Y., October 4, 1861, and was the son of Rev. Edward David and Sarah G. Rosa. In March, 1894, he was married to Mary Evans, of Harrisburg, Pa.

Dr. Rosa was a graduate of Wesleyan University, Middletown, Conn., in the class of 1886. He was a member of the Delta Kappa Epsilon Fraternity. After leaving Wesleyan he entered Johns Hopkins University as a graduate student and received the degree of doctor of philosophy in 1891. In 1906 the honorary degree of doctor science was conferred on him by Wesleyan University.

For a short time he was instructor at the University of Wisconsin, leaving there to become professor of physics at Wesleyan University. He became the chief physicist at the Bureau of Standards in 1901.

He has done notable work in science and electrical engineering. At Wesleyan University he developed the physical side of the respiration calorimeter with Prof. W. O. Atwater. This apparatus was of great value in the pioneer investigations on the value of foods and the study of nutrition problems. He took a leading part in the researches to establish the fundamental electrical units after coming to the Bureau of Standards and served as secretary of the International Committee on Electrical Units and Standards. He has developed the electrical work of the Bureau of Standards from small beginnings into an organization covering the scientific and engineering aspects of a great national laboratory.

When Dr. Rosa took charge of the electrical division of the Bureau of Standards, in addition to the general supervision of the work of the division, he took active charge of the section on inductance and capacity and absolute measurements. As the work of the electrical division grew it was necessary for him to relinquish some of the detailed work of this section. However, he remained in active charge of the section until the division moved into the electrical building in 1915.

When Dr. Rosa began his work in the electrical division it was his ambition to determine a number of the fundamental electrical constants. In conjunction with Dr. Dorsey he immediately undertook the determination of the ratio of the electromagnetic and electrostatic units. The results obtained are the most accurate which have ever been determined.

About 1907 Dr. Rosa and Dr. Dorsey started their work on the determination of the ampere. This work ran over a period of years and gave a value of the ampere which had not previously been equaled. In order to be able to reproduce the ampere in a concrete way Dr. Rosa and Mr. Vinal started work on the silver voltameter. This was carried on simultaneously with the absolute determination of the ampere so that now we are able to define the ampere in a satisfactory manner.

Dr. Rosa devised a new apparatus for determining the absolute value of the ohm. Models of this were tried in 1908 and 1909 and gave promise of satisfactory results. However, the pressure of other work compelled the abandonment of this experiment but he had always hoped that the time would soon come when it might be continued.

Edward Bennett Rosa

Dr. Rosa found that the formulae or the computing of inductance were not well developed and were scattered widely through the literature. He undertook to collect these formulae together and in doing so found it desirable to considerably increase their number. During his early years at the Bureau he published a large number of papers on the computing of inductance. Finally, in connection with Dr. Grover, he collected together practically all the known formulae for computing inductance. This collection is known the world over as being a model of its kind.

In 1910, there was instituted under Dr. Rosa's direction an exhaustive investigation into the subject of electrolytic corrosion of underground gas and water pipes, and lead cable sheaths due to stray currents from electric railways. This problem has for years been one of major importance to public utility companies throughout the country, and prior to the work being taken up under Dr. Rosa's direction at the Bureau of Standards very little definite information was available as to the laws governing electrolytic corrosion or the methods of reducing trouble from this source. The work done under his direction included a definite establishment of laws governing electrolytic corrosion, and much progress in the direction of mitigating trouble of this nature. This work has for a number of years been carried on in close co-operation with the utility interests of the country through the medium of the American com-

mittee on Electrolysis, of which Dr. Rosa was a member.

During the war, Dr. Rosa directed the development of a number of scientific instruments which were of inestimable value to the American forces in France. Among these might be mentioned a sound ranging device for locating big guns; the geophone for the detection of mining operations, the development of aircraft radio apparatus, and the improvement of radio direction finders by which enemy ships and air craft could be located. Under his direction at the Bureau of Standards was established perhaps the finest radio research laboratory in the country, and he has always shown an intense interest in improving apparatus and methods of radio communication.

In addition to his diversified work in the field of electrical research, Dr. Rosa was keenly interested in the prevention of industrial accidents and in the promulgation of safety standards for use by State, municipal and insurance organizations. He conceived the idea of a national electrical safety code several years ago and the present code is largely the result of his efforts. Similarly the bureau has undertaken a number of other national safety codes, the safety code section working under his direction.

His broad vision showed him the need of a central clearing house for engineering standards. For years he worked whole-heartedly to bring about the formation of such an organization. It was due in no small measure to his efforts that the American engineering standards committee is now functioning.

The broader aspects of the scientific and engineering work of the Federal Government were clearly presented in a series of papers by Dr. Rosa, while his analysis of Government expenditures was largely quoted by leading periodicals, as well as in both Houses of Congress. His last paper on this subject, now in press, would in itself have established his national reputation.

Dr. Rosa was a charter member and one of the officers of the Federal Club, an organization of executives of the various governmental departments.

Dr. Rosa received the Elliott Cresson Medal of the Franklin Institute. He was a fellow of the American Institute of Electrical Engineers, the American Physical Society, the American Association for the Advancement of Science, and a member of the National Academy of Sciences. He was also a member of the Illuminating Engineering Society, Washington Academy of Sciences, and the Philosophical Society.

Over ten years ago the Bureau of Standards undertook an investigation of calorimeter standards and flame standards for gas photometry. This work progressed and expanded into other gas-testing work and into an investigation of gas service standards.

In 1913, Dr. Rosa and R. S. McBride published Technologic Paper No. 14, entitled "Legal Specifications for Illuminating Gas." In 1912, the first edition of Circular No. 32, "Standards for Gas Service," was published, which has recently reached its fourth edition. The influence of this work is reflected in most of the State rules for gas standards now in force.

Dr. Rosa took an active part in preparing the many other publications on gas testing methods which are now considered standard reference books on the subjects covered.

Dr. Rosa always fought fearlessly for what he considered a square deal for the public, but at the same time he fully recognized the valuable service rendered by the utilities, and thus won the respect of the utility interests by his impartial and fair attitude in controversies that arose between the public and the utility interests and in which the Bureau of Standards was called upon to render expert opinion.

Educational Efforts Producing Results

(*Continued from page* 462.)

States have made careful surveys of the results accomplished under Mr. Reid's plan of customer-ownership, and thus far no flaws have been found therein. And, meanwhile, the banks of the State are gradually becoming the targets for more definite plans of co-operation with the utilities than has been the case heretofore. The whole program of financial extension by the utilities is simply another link in the chain which is being forged by the Indiana utilities to bind them more tightly to their consuming public.

As an example of how the campaign of the utility companies is bearing fruit, utility men are pointing to a speech made last week by Harry O. Garman, chief engineer of the Public Service Commission of Indiana, before the Optimists' Club at Indianapolis. Regarding the general utility situation Mr. Garman said:

"We may expect a return to normalcy by September. All of the utilities are looking up. They are all on their backs and there is no other way to look. However, they are emerging from a ragged condition, both financially and physically, and I believe a normal state of affairs will obtain by September. Public utilities governed by fixed rates naturally will be the last to declare decreases, but better service is expected of all. That the utilities are picking up in a measure is proved by the fact that banks again are beginning to take an interest in utility stock, which six months ago could not be sold at any price."

The effect of the general educational campaign on members of the Indiana Public Service Commission is very graphically shown in a statement from Commissioner Glenn Van Auken, who handled the recent decision in the big Citizens Gas Company rate case.

"The Hoosier, as he goes up and down the highways of the world, is the greatest booster extant for his native State," Mr. Van Auken said. "The more he travels the better Indiana appears by comparison and the more confident he becomes in his assertions. We who have to do with public utilities would like to be able to say that Indiana has the finest utility service in the world; that its telephone, electric, gas, street and interurban railway service is the most satisfactory; that the rates, considering the kind of service furnished, are the lowest; that our utilities are honestly and efficiently operated by men in whom we have confidence; that Indiana utility securities are good investments; that Indiana, on account of the quality of these necessities of life, is a most desirable place to live. In many particulars we have arrived at this ideal; in some particulars we are behind but not by any means hopelessly distanced. The desired result may be attained if there is co-ordination of effort by the utilities, the cities, the consumers and the State.

"The four parties named are all a part of the public with identical needs, and not four different parties with

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American Gas Journal

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As the Journal Views It

Fair Dealing on Both Sides

Under the heading "Fair Dealing by a Great Corporation," the Newark (N. J.) *Ledger* had the following to say:

"On the heels of winning in all the litigation to restrain it from charging more than the 80-cent statutory rate for gas, the Consolidated Gas Company has announced a voluntary recession in the price of gas, effective August 1, in New York, from $1.50 to $1.25. The cost of gas oil having dropped after the present supply is used up, it is stated, the company will pass the saving along to the public. If other operating expenses decline, it says, it will make further cuts.

"That is the right spirit.

"Such evidence of a disposition on the part of corporations that serve the people of their own volition and upon their own initiative to give their customers a square deal will do more to bring about an understanding and good feeling, in place of suspicion and enmity, than anything else. It is a case of actions speaking louder and more convincingly than any verbal professions."

We are giving part of the space that we reserve exclusively for comment by the editor to this, for it simply emphasize the point that the AMERICAN GAS JOURNAL made last week. There are hundreds of other examples throughout the gas industry of the spirit of fair play that animates gas men generally but because of the prominence of the Consolidated Gas Company of New York its action has been the subject of a great deal of comment.

This expression by the *Ledger*, one of the large

dailies of New Jersey, is only one of many similar comments that have been published on this action.

The fact that newspapers are able to give credit for actions of this kind is an indication that there has been, and is being, created a greater understanding of the difficulties under which this industry labors. It also shows that there is an appreciation of the fact that the industry is composed of reputable business men who are trying with all their powers to render real service to the communities in which they are situated.

Tell Them About It

"You fellows in the gas industry take yourselves too seriously," remarked an acquaintance the other day. "What have you done that warrants your attitude toward the rest of us folks?"

For an instant it would appear that the remark was inspired by a holier-than-thou attitude on the part of gas men generally, but it was explained that it was not meant that way but that it was meant from the standpoint of assertions made by gas companies that a failure of service would be a calamity.

That remark—made, incidentally, by a well-informed man—was more or less typical of what we hear from time to time on all sides. People point out that before gas became generally used the country got along, and they are also in the habit of declaring that the country could exist, or at least that part of it could exist that was deprived of gas service.

It took only a few minutes to recite some facts of what happened in various communities when the gas service was discontinued even temporarily that proved surprising and which silenced his remarks. But it was the final statement that aroused us. "Why don't you tell the public something about such a condition?" he asked.

Well, Mr. Gas Man, why don't we? There have been, unfortunately, accidents in various sections of this country which have resulted in great hardships and suffering for the communities served by gas companies. There have been newspaper reports of these occurrences, but it has seemed as if these reports were confined to the immediate territory affected and were not nationally known. But we can hardly expect that someone else is going to spread our story broadcast for us without some help from us. Now, the way we can help is to see that the communities in which we operate are thoroughly advised of what happens when the gas goes off the town. If this is done, then there can be no doubt but that the efforts of companies to keep going under any and all circumstances will receive greater recognition on the part of the public and we will not be accused of inflating our chests just because we are in an industry that is one of the most vital to the world's comfort and health.

Being a gas man may have its drawbacks when it comes to dealing with a certain class of persons, but it also has its rewards in knowing that we are performing a service that cannot be measured from a dollars-and-cents standpoint any more than money can buy loyalty. Gas men are loyal to their trusts, and as long as this condition exists we need have no fear of the future no matter what attacks we are made to bear.

Dr. Edward Bennett Rosa

Through the sudden death of Dr. Edward Bennett Rosa of the Bureau of Standards the gas industry has lost a man who was closely connected with the developments in our field. Dr. Rosa had long been associated with the work of the Bureau of Standards, having assumed his position in 1901.

Although there were many times that Dr. Rosa differed with representatives of the gas industry regarding many important matters, he engendered a great deal of respect by his attitude. Dr. Rosa was what is known as a "square fighter," and he stood directly back of his own work, taking full responsibility. Dr. Rosa was one of the foremost physicists of the world and his opinion was widely sought. He was ever generous and spared no effort to be of real service to the world.

The career of Dr. Rosa was the career of a successful man. He accomplished great things in his own field of endeavor, and the results of his work will live always. Truly, his sudden taking away will prove an international loss.

To his close fellow workers, those men who had the advantage of intimate contact, the AMERICAN GAS JOURNAL extends its heartfelt sympathy.

Educational Efforts Producing Results

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conflicting interests. There is no such thing as the term 'Public on the one hand and utility on the other.' Forget the irritating remark often made, without the slightest knowledge of the facts, that 'This utility is rolling in wealth, and at the same time permitting its service to go to the devil,' or, 'The consumers of the utility demand the highest quality of service and expect to get it for nothing,' or, 'This or that municipal official is playing bad politics to the detriment of his city,' or, 'The commission is prejudiced.'

"Honest criticism all around is good for everybody concerned. Mere hearsay suspicion should not be voiced when every possible means of accurate information is accessible. Credit the other fellow with being honest in his intentions and with trying to do the right thing, and we will not be wrong once in twenty times.

"Bear in mind that poor service at a low rate is like shoddy clothing at a low price, the most expensive to both seller and buyer. The most reasonable rate is one that will yield sufficient revenue to enable a utility to maintain the finest and most up-to-date equipment; to retain a force of ambitious employees; to sustain its credit so that it may finance on reasonable terms the required extensions and improvements.

"The utility that gives good service has the least

trouble to secure adequate rates and is the most valuable. No city can grow and prosper unless its utilities expand and develop with it. The utility products are necessities of life. Their difficulties and problems intimately affect and must be understood by the whole community. The solving of utility problems requires straightforward public relations, better understanding and more pulling together. The definite purpose in view is to safeguard and perpetuate the water, light, power, heat, communication and transportation service for the good of the whole citizenship and for the comfort, convenience and happier existence of each individual."

This statement from an individual commissioner was ably backed up in Indiana by a statement from the full commission, just issued through bulletins to the general public, in which the commission reviewed the Indiana situation for the past four years. While it did not mention the gas companies specifically, it referred to all types of utilities, and the gas companies, of course, are amenable to the same war and post-war suggestions and reports as are the other utilities. The commission's statement said:

"It is with frank satisfaction that the commission, in closing the four years which have included the active war period and the more trying post-war era, may point to the fact that this State has emerged from these trying ordeals with her public utilities and railroads intact. Notwithstanding the most extraordinary handicaps, there has been less curtailment of service in Indiana than in surrounding States. Utility rates are lower and the utilities are in better condition than in most other States. There are fewer utilities in the hands of receivers in Indiana to-day than before the war. Of 118 electric street and interurban transportation companies in hands of receivers on the date of last report, only one was in Indiana, and that receivership antedated the war period.

"Less than a half-dozen are financially involved. Their difficulties arise not only of conditions that were honestly incident to the difficult period but to fundamental defects.

"Labor and materials and supplies used in operation and maintenance have advanced 100 to 300 per cent over 1915. Taxes have increased approximately 100 per cent in the last four years. Freight rates on transportation of coal, on materials and supplies also are at least 100 per cent above those prevailing in 1917. Utility rates have not been advanced in any such proportion. Generally speaking, the increases have been small."

And, in conclusion, it is well to select at random, from hundreds of similar clippings from Indiana newspapers relating to the utility situation at present, one statement from a Lafayette, Ind., newspaper, *The Courier*, which indicates just how effective the "Tell the Public" campaign has become with the average Indiana newspaper editor. *The Courier* said editorially the other day:

"That a great change is being wrought in the attitude of the public toward utilities that serve the public, in their respective communities, can scarcely be denied.

"The people are beginning to realize how necessary it is to have public utilities capable and willing to furnish adequate street railway, gas, electric, water and telephone service.

"They have learned that unless a community has all these services it cannot keep step with the growth and prosperity of other communities that are more fortunately situated regarding their utilities."

Adapting Electrical Cleaning to Blast Furnace Gases

(*Continued from page* 467.)

Table No. 5—Values of Vs/Ts

Vs based on 1,000 grams of saturated steam.
Ts absolute temperature at saturation.
Pressure in inches of water below and above one atmosphere.
Atmosphere equals 14.7 lbs. per sq. in.
29.92 in. Hg.
33.93 ft. of water at 60 deg. or
407.16 in. of water at 60 deg.
One inch of water equals 0.0735 in. of mercury.

Pressure in Ins. Water Below 1 Atmos.	Saturation Temperature	Vs/Ts	Pressure in Ins. Water Above 1 Atmos.	Saturation Temperature	Vs/Ts
20	209.5	0.0930	20	214.2	0.0840
18	209.8	0.0925	18	214.0	0.0844
16	210.0	0.0920	16	213.8	0.0846
14	210.2	0.0915	14	213.5	0.0851
12	210.5	0.0909	12	213.3	0.0855
10	210.8	0.0904	10	213.0	0.0860
8	211.0	0.0899	8	212.8	0.0864
6	211.2	0.0894	6	212.6	0.0868
4	211.3	0.0889	4	212.4	0.0873
2	211.7	0.0885	2	212.2	0.0877
0	212.0	0.0881	0	212.0	
1 atmos.					

These four determinations having been made, it is possible to proceed with the general design of a cleaning plant.

Methods of Cleaning Blast Furnace Gases

The methods of cleaning blast furnace gases are divided into two camps:

Wet Cleaning.
Dry Cleaning.

A great deal of money has been spent in this country in the development of wet cleaning methods and a great many wet cleaners are now installed on blast furnace plants throughout the country. Nevertheless because of certain fundamental undesirable factors, there has been a tendency on the part of blast furnace operators to get away from wet cleaning and to go to dry cleaning.

The main objections to a wet cleaning process are:

The loss in sensible heat due to the reduction of temperature of the gas when using large quantities of water which are necessary in order to get the best results from this method.

A table taken from Mr. Diehl's paper, before the American Institute of Mining Engineers in 1914, shows that nearly 8 per cent greater B.t.u. value exists because of the sensible heat in the gases when using unwashed blast furnace gas at 400 deg. Fahr. and with thirty-five grains of moisture per cubic foot, than can be obtained when using washed gas at 70 deg. Fahr. and with moisture saturation at 70 deg. This means that about 8 per cent of the coke used in

production of iron with washed gas might have been saved if the sensible heat of that gas had not been lost in the process of washing. When using 625 tons of coke per day, at a 500-ton blast furnace, about fifty tons of coke might have been saved per day. At $6 per ton, the saving is $300 per day, and for 300 days the saving is about $90,000. This, of course, is a worthy economy.

The second objection is the pollution of streams. It has been found that at several blast furnace plants, fish life, bacteria are eventually destroyed in those streams where the effluent of the washer is discharged. This has resulted in some places in the enjoining of the furnaces from discharging the effluent into the streams. In other places it has resulted in controversy. The trend of municipal and State authority is toward the prohibition of discharges that are dangerous to fish life. The elimination of this possible contention is advisable.

The third objection is that wet washers often are not very efficient. The result is, especially where there is so much fume in the gas, that the washer does not remove the fume and dust to a sufficiently great degree. The dampened particles of fume and dust deposit in the stove burners and in the boiler burners until they become a hard mass which eventually has to be dug out with chisel and hammer At some plants, this is a real nuisance and causes money losses due to the necessity of shutting down the stoves and boilers and cleaning them.

Another objection is the necessity for large quantities of water. This is not always available. More than one plant has not gone to cleaning its gases because of its inability to get water.

Throughout this paper it must be understood that the cleaners which are being discussed are not secondary cleaners or intensive scrubbers, but are primary cleaners, used for purposes or removing the dust from the gases to such a degree that the gas may be burned effectively in the stoves and boilers and not at all intended for the cleaning of gases for gas engine purposes.

Dry Cleaners

In Europe the practice has been somewhat different from that in the United States, as there were early efforts to develop dry cleaners. As a matter of fact dry cleaners have been operating in Europe for some time and have been mainly objectionable for two reasons:

Their high cost.
The possible damage to the cleaner.

The cleaners built in Europe were of the bag type and while they cleaned the gas more effectively than any primary cleaner could, and even went so far as to prepare the gases for gas engine purposes, the bags, being of an inflammable nature, necessarily were subject to destruction whenever the heats put through the cleaners exceeded the safe limits of the material of which the bags were made. The high cost, also, of installation of this type of cleaner, militated very greatly against their adoption and perhaps was the chief reason why such dry cleaners were not installed in this country.

Perhaps a third feature which militated against the use of those dry cleaners was the fact that the sensible heat lost in the cooling of the gas robbed the gas of a great deal of the economies which might be obtained were the sensible heat retained.

With dry cleaners that are able to pass the gas without any considerable reduction in temperature, there is to be added to the efficiency caused by the cleaning of the gas, the efficiencies effected by the use of the sensible heat. Certain difficulties, however, in the cleaning of gases by the dry process must be taken care of.

Any screen type of cleaner which attempts to filter out particles of dust and fume, even when the filtering medium is not destroyed by the normal heats of the blast furnace gas, must be sufficiently fine in nature to present a hole smaller than the finest particle of dust and fume going through in order to successfully remove the objectionable solid material in the gas. If the screen is so fine that it will remove the particles of fume, the back pressure will be high and the screen will clog up quickly. If the screen is designed with apertures large enough to prevent any considerable back pressure, the fine particles of fume and dust will go through. The problem, therefore, of screening the fume and dust out of the blast furnace gas is not a simple one.

This same difficulty was encountered during the war in the elimination of mustard gas, existng not in the form of gas, but in the form of dust and fume of a very fine nature. When the mask was made with a filter fine enough to keep all of the mustard gas out, breathing was exceedingly difficult. When the mask was made to make breathing easy, mustard gas fumes at times penetrated the mask. The American Chemical Warfare Service, at the time of the armistice, had developed an apparatus for removing the danger due to the inbreathing of mustard gas and the difficulty of breathing through a very closely packed filter. The apparatus which the service decided to try out was exactly in principle the one kind of apparatus that is now being applied to dust and fume collection from blast furnaces gases.

Handling of Hot Gases

It is very evident on further thought that conditions arise when the gas discharging from the furnace top is very hot and it is impossible to utilize any system of dry cleaning without destroying the cleaning medium, for instance, in the manufacture of ferromanganese, the gases discharging from the furnaces have temperatures running as high as 1,500 deg. Fahr. As steel glows red hot at temperatures of this kind, some necessity arises for cooling the gas to such a point that destruction of the steel does not take place. As a matter of fact, both at Dunbar and Sheridan, where ferromanganese is made, the problem has been a very serious one.

It has not been a question of whether the cleaner could operate or not at such temperatures, but simply of whether steel could maintain its strength or not under such conditions of stress. As all steel men well know, the strength of steel drops very rapidly with the increase of temperature, until at about 1,500 deg. the strength is less than one-quarter of the original strength. Some means must be devised to cool the gases to such a point that they may be safely passed through the cleaner. This problem is not at all present in furnaces manufacturing pig iron as the temperatures rarely run over four to five hundred

degrees, and even in exceptional cases, they rarely run over seven to nine hundred degrees. Steel can be made to stand this strain. With the hotter gases, however, it is necessary to design coolers that will function without the addition of moisture to the gases. If it is desirable to cool the gas which is as high as 1,300 deg. Fahr. to a temperature between 400 and 500 deg., so as not to lose the sensible heat which is present in the gas at this lower temperature, care must be taken not to add water for cooling purposes as the amount of water present when the gas is saturated at 400 deg. is so great that it would seriously handicap combustion in the stoves and boilers. A cooler therefore must be of such a type that the heat is transferred from the gas into the water through tubes and not by direct contact.

In actually designing one of these coolers, the following formula was used, and it was possible to check the design of this cooler after it went into operation. The results obtained are within 85 per cent of the calculated figures.

Sh = specific heat of gas.
Gw = weight of gas per hour.
Gt_1 = temperature of inlet gas.
Gt_2 = temperature of outlet gas.
Wt_1 = temperature of inlet water.
Wt_2 = temperature of outlet water.
C = constant (5).
A = condensing area in square feet.

$$A = \frac{Gw \times Sh\ (Gt_1 - Gt_2)}{[\frac{1}{2}\ (Gt_1 + Gt_2) - \frac{1}{2}\ (Wt_1 + Wt_2)] \times C}$$

$$Wt_2 = Sh \times Ws \div W \times (Gt_1 - Gt_2) = Wt_1$$

$$W \div K = 5 \qquad K = Gw$$

A typical example of calculation per 200 tons of pig iron per twenty-four hours is as follows:

200 tons coke per day—400,000 lbs. coke per day.
65 cu. ft. gas per lb.
26,000,000 cu. ft. gas per day.
1,080,000 cu. ft. gas per hr.
18,000 cu. ft. gas per min.

1,080,000 cu. ft. gas per hr.
Wt per cu ft. blast furnace gas = 0.081 lbs.
Spec. heat blast furnace gas = 0.24.
Temp. inlet water = 60 deg. Fahr.
Temp. outlet water = 150 deg. Fahr.
Temp. inlet gas = 1,200 deg. Fahr.
Temp. outlet gas = 400 deg. Fahr.

1,080,000 × 0.081 = 88,000 lbs. gas per hr.

$$A = \frac{88{,}000 + 0.24\ (1{,}200 - 400)}{[\frac{1}{2}\ (1{,}200 + 400) - \frac{1}{2}\ (60 + 150)] \times 5}$$

A = 21,100 (800) ÷ (809 — 105) 5 = 16,880,000 ÷ 695 × 5

A = 4,850 sq. ft.
1 length 4 in. pipe 30 ft. long has area of 30.14 sq. ft.

4,850 ÷ 30.14 = 161 lengths.

Check:
5 B.t.u. transmitted per sq. ft. per hr. per deg. of difference in temperature.

Then:
4,850 sq. ft. is area.
(1,200 + 400) — (150 + 60) ÷ 2 = 965 deg. Fahr. = difference in temperature.

Then:
B.t.u. transmitted per hr. = 4,850 × 695 × 5 = 16,900,000
Now gas gives up 88,000 lb. gas per hr.
Specific heat = 0.24
Difference in temperature 800
Then B.t.u. given up by gas per hr. = 88,000 × 0.24 × 800 = 16,850,000 B.t.u.

Water used:
Difference in temperature 90 deg. Fahr.
B.t.u. absorbed 16,900,000 per hr.

16,900,000 ÷ 90 = 187,000 lb. per hr. = 22,600 gal. per hr. = 376.6 gal. per min.

Here we are dealing particularly with electrical cleaning of blast furnace gases and all that has been discussed up to this point has been general in nature and has been adaptable to all investigations for cleaners.

Electrical Gas Cleaning

The electrical cleaning of gases, as developed several years ago by Dr. F. G. Cottrell, is a very simple process making use of a few fundamental facts in physics.

The principle involved is not a difficult one and can most easily be understood by conceiving of a gas passing through an invisible electrical screen so fine that the finest particle of fume cannot pass through, yet occupying no space, having no material body and consequently presenting no source for back pressure. It is by means of this electrical screen interposed between the outlet of the furnace and the inlet to the hot stoves and boilers that blast furnace gas may be cleaned of its dust and fume content to a degree finer than any mechanical screen can clean it without the considerable loss of back pressure.

The reason for this is that the electrical screen is not woven of wires, but is woven of lines of electrical force. The threads of force constituting the screen are so closely knit together that a substance must drop below its molecular form to get through when conditions are correct for the screen to operate. Yet, these lines of force, having no material body, do not interrupt the flow of gas on which they have no effect whatever. In a simple manner, the action of an electrical cleaner may described as follows:

The gas is conducted through a vertical pipe. It enters from the bottom of the pipe and issues from the top. An electrode chain or wire is suspended vertically in the exact center of the pipe. It is held taut by a weight at the bottom. This electrode is charged with high tension unidirectional current. It therefore must be suspended on the proper insulators, which are capable of withstanding the potential under which they are impressed. The pipe itself is grounded. When the dirty gas passes through the pipe and comes into contact with the charged electrode, it becomes ionized. As the electrode is negatively charged and has a corona discharge due to the high potential impressed upon it, the ionization of the gas is rapid

and thorough. The gas molecules carry the charge to the dust particles which for the most part are negatively electrified since the electrons prevail in the gas. Immediately upon being charged, the dust and fume particles are repelled by the electrode and are deposited on the sides of the pipe which interrupt their flight from the chain. Within the pipe, therefore, there are three forces in action. There is a vertical force due to the velocity of the gas which is carrying the dust and fume particles upward. There is the force of gravity which tends to carry the dust particles downward. Since the force due to the upward velocity of the gas is very much greater than the force due to the action of gravity, the resultant of these two is a vertical force upward. The third force is the force caused by the charging of the dust particles through the ionization of the gas. This is a horizontal force, as the action of the repelling of the particle from the chain is at right angles to the chain. The resultant of these two forces is a diagonal of a parallelogram, having both these forces as sides. If the vertical force is very great, too great for the particular pipe described, the horizontal force may not be sufficient to cause a resultant that would precipitate the particles of dust to the sides of the pipe. While the particle of dust would be acted upon by the horizontal force, the resultant might be such that the particle would not travel to the side of the pipe within its length.

Application of the Theory to Practical Conditions

The problem, therefore, in electrical precipitation is to regulate the vertical force so that it is not too great and to regulate the horizontal force so that it is sufficiently great to form a resultant which will precipitate the particles of dust to the side of the pipe. The principle is not simply one of ionization and is not one of magnetism. The particle of dust does not stick to the side of the pipe because of the magnetism caused by the corona discharge and gas flow. The dust particle sticks to the side of the pipe because it is held there fast by the resultant electrostatic force that is acting upon it throughout the entire period of operation. It is as though an arm had extended diagonally from a point on the electrode and pinned the particle of dust to the side of the pipe with a finger and were holding it there without letting go. The control of the vertical force is, of course, made in the design of sufficient cross sectional area in a precipitator to give what has been found to be the best velocity of the gas for precipitation purposes. To get the horizontal force necessary for precipitation is a question of design of electrical equipment. The voltage that can be impressed on the electrode is limited by the gap between the side of the pipe and the electrode. This has erroneously led to the assumption that the bigger the pipe and the greater the voltage that may be impressed, the stronger the force that may be secured to act horizontally. This is not true, as the force varies inversely as the square of the distance between the object to be precipitated and the electrode, so that even with higher voltage, the impressed force on the particles may be less than with lower voltage.

Results Obtained

The results obtained both at Sheridan and at Dunbar have been satisfactory. At Sheridan, particularly, the precipitators have been operating continuously and collecting approximately 5,000 lb. of dust per day from approximately one-half of the gas output of a 250-ton furnace.

This dust is extremely fine in nature and ignites on exposure to air. It has consequently been impossible to determine the fineness of the dust as it sinters as soon as it is dumped and screen tests taken after the dust has cooled off do not indicate the condition of the dust when collected.

When tests were made on the Dunbar plant, running on pig iron, before it was turned on ferromanganese, the indications were that the precipitator could clean ordinary gases from a pig iron furnace to less than one-tenth of a grain. The two plants now running have clearly indicated that electrical precipitation is on the right road as an effective method of cleaning gases from blast furnaces.

Acknowledgments

The writer wishes to acknowledge his indebtedness to H. F. Fisher, formerly associated with the Company which the writer represents, and K. V. Laird, now associated as electrical engineer with the writer for the work which they have done in the study and development of electrical precipitation and equipment.

He is also indebted to John J. Howard, general manager of the Lavino Furnace Company who has helped considerably in the development of the Sheridan precipitation plant, and to Harry Kennedy, superintendent at Sheridan, for the co-operative spirit he has shown in the work done there, and also to J. J. Gering, engineer at Sheridan, for the practical development he has done in connection with all the work at Sheridan.

Conservation of Natural Gas Urged

(*Continued from page 468.*)

Three-Part Service

The three-part service, as explained by Mr. Strickler, would have a tendency to cause consumers to be more conservative, in that they would contract for only the amount they figured on using and would be careful not to exceed that amount.

Explaining the first part of the rate, he said this would include the cost to the company of furnishing service to the customer and the amount would depend upon the number of customers. It would include cost to the company of bookkeeping, meter reading, billing, interest and other items of this sort, and would be payable monthly.

The second part of the rate would be the customer's portion of the amount that it cost the company in producing, transmitting and distributing the commodity, and an ample amount for their investment.

The third part is known as the "consumption charge." It is based on the quantity of gas furnished each month to each consumer, and is expressed in cents for each thousand cubic feet. In following this system, Mr. Strickler explained, each gas user would pay proportinate amounts and consequently would be more conservative. It also was explained that by use of the

meter efficient pressure could be maintained, which also would prevent wastage.

This system, Mr. Strickler said, was installed last in Ottawa, Kan., and had proved successful from a conservative standpoint. It was installed there after having been approved by the Utilities Commission of Kansas.

Good-Will Campaign Urged

An advertising campaign to make the gas industry situation clear and to gain the good-will of the public was asserted to be necessary by H. S. Butler, of the Butler Advertising Company, Columbus, Ohio. He said:

"Silence for years on the part of persons interested in the industry has resulted in a tremendous mass of misinformation about this utility becoming lodged firmly in the public minds which could be dispelled only when the true facts were placed before them.

"The only time the public hears from operators of this industry is when you want higher rates. They do not stop to think that of every three wells drilled one is a 'duster' and two others are not worth connecting. Nor do they know that it costs at least $10,000 to equip each well, to say nothing of the cost of laying pipe and obtaining leases and rights-of-way. The average person is of the opinion that all that is necessary to supply natural gas is to dig a well and you have gas.

"By placing the threatened exhaustion of this commodity before the public and gaining their good-will, when asking for increase in rates you will not have to fear legislators and demagogic councilmen, because the public, by the information furnished to them by you, will have an enlightened opinion on the subject and, being fair-minded, will stand with you for a fair deal and honest game."

"Publicity setting forth the complex details in the operation of public utilities is very necessary," Byron M. ClenDening, public utility counsel, Columbus, Ohio, told the delegates. Mr. ClenDening took for his subject "The Commission, the Public and the Utility." In regard to bringing the problems and difficulties of utilities before the public he said:

"In this State a bureau of publicity, which seeks to bring utility subjects before the reading public, has been established. This is a step in the right direction and already is bringing satisfactory results. The average man is too busy with his own problems to investigate complex details relative to these utilities, but under the publication plan they are explained to him through bulletins and local newspapers."

The speaker called attention to the fact that contracts for this commodity made years ago now are expiring, and said that rates on a sliding scale upward appear to operate to save gas.

"The increasing cost in large consumption tends to restrict the use of gas for large industrial purposes," he said, "and a proper rate leads the domestic consumer to value the product and lessen its waste by providing, using and adjusting more efficient appliances in the home.

"The Ohio commission has urged upon gas companies that they begin a campaign of education of the people, and many companies now are informing their customers of the amount they may have by the use of more economical appliances, even at a little greater cost of the gas."

John P. Campbell, a district foreman of Lumberport, W. Va., discussed the difficulties encountered by one in his position.

"One of the most aggravating and difficult duties a West Virginia foreman has had to perform," said Mr. Campbell, "has come to him within the last few years —that is, to put in operation an order of the State Public Service Commission requiring all gas, whether free or pay, to be measured and reported to the commission. In order to carry this out it is necessary to maintain a meter on the line or well of the free consumer, and in nearly every case the setting of this meter has been bitterl yresisted by the landowner. When foremen began setting these meters they were met with force and threats by the landowners, anywhere from personal assault to murder.

"Free consumers denied the right of the commission to issue such an order. They insisted that this was a right they had under the contract and the commission had no authority to put an interpretation thereon. Resistance was so determined that a suit was brought by the Pittsburgh & West Virginia Gas Company against a man in Marion County to enjoin him from interfering with the installation of a meter. The case was finally decided by the Supreme Court of Appeals, which held that the commission had a right to issue such an order; that gas companies must obey the order, and the court would restrain the landowner from interfering with the gas companies in complying with the commission's rule.

"Even after the court had handed down its opinion many free consumers refused to accept it as the law of the State, and the foremen have continually, up to this time, been confronted with the difficulty of installing the meters against the stubborn resistance of landowners.

"This resistance has been so effective that the gas companies are yet obliged to go into court and ask for a restraining order in a great many cases before the foremen can be protected against the enforcement of a forfeiture clause in his life insurance policy, on the ground of engaging in a hazardous business."

Kansas City was chosen as the convention city of the Natural Gas Association of America in 1922 at the closing meeting.

The following officers were elected: President, L. B. Denning, Pittsburgh; vice-presidents, E. P. Whitcomb, Pittsburgh; H. L. Montgomery, Bartlesville, Okla., and N. C. McGowan, Shreveport, La.; secretary-treasurer, William B. Way, Pittsburgh.

The following directors were elected for two years: C. W. Seers, Cleveland; Thomas J. Jones, Columbus, Osio; Lawrence K. Langdon, Cincinnati; Harry A. Wallace, Dallas, Tex.; M. W. Walsh, Louisville, Ky.

The following directors were elected for the two-year term last year and have another year to serve: G. F. Batchelor, Pittsburgh; L. S. Horner, Clarksburg, W. Va.; F. F. Schauer, Pittsburgh; William Moeller, Taft, Cal.; J. W. McMahon, Toledo, Ohio.

The advisory board is composed of the past presidents, and Harry J. Hooven was added to the board as retiring president.

The directors for the year are: Fred A. Miller, Bradford; T. C. Clifford, East Pittsburgh; F. R. Hutchinson, Cleveland, Ohio; Laramour, Adams, Erie; O. F. Felix, Z. O. Felix, W. P. Glover, William B. Way, E. S. Rooney, A. W. Thompson, William Patterson, R. A. McKinney and F. W. Miner, all of Pittsburgh; B. T. Brostel, Chicago, and George D. Roher, of Rockford.

Public Utilities Securities Market Report

Prices of Representative Gas Bonds

(Quotations furnished by The National City Company)

Company	Issue	Maturity	—Market— May 26, 1921 Bid	Asked
American Lt. & Trac. Co.	Five Year 6s	May 1, 1925	89	90
Brooklyn Union Gas Co.	First Consol. 5s	May 1, 1945	78	80
Columbia Gas & Elec. Co.	First 5s	Jan. 1, 1972	83	84
Consol. Gas, Elec. Lt. & Pr. Co. of Baltimore	First Ref. 7½s	Dec. 1, 1945	98	98½
Consol. Gas, Elec. Lt. & Pr. Co.	General 4½s	Feb. 14, 1935	73¼	73½
Consol. Gas Co. of New York	Sec. Conv. 7s	Feb. 1, 1925	100⅜	100⅝
Consol. Gas Co. of New York	One Year Sec. 8s	Dec. 1, 1921	99⅛	100⅛
New Amsterdam Gas Co.	First Consol. 5s	Jan. 1, 1948	61	64
Denver Gas & Elec. Co.	Gen. (now 1st) 5s	May 1, 1949	80	82
Detroit City Gas Co.	Gold 5s	Jan. 1, 1923	90	93
Equitable Illum. Gas Lt. Co. of Philadelphia	First 5s	Jan. 1, 1928	94½	96
Hudson County Gas Co.	First 5s	Nov. 1, 1949	71	75
Laclede Gas Light Co.	Ref. & Ext. 5s	Apr. 1, 1934	74½	75
Louisville Gas & Elec. Co.	First & Ref. 7s	June 1, 1923	94	95¼
Michigan Light Co.	First & Ref. 5s	Mar. 1, 1946	68	72
Milwaukee Gas Light Co.	First 4s	May 1, 1927	81	82½
Pacific Gas & Elec. Co.	Gen. & Ref. 5s	Jan. 1, 1942	76⅞	77⅛
Pacific Gas & Elec. Co.	Col. Tr. Conv. 7s	May 1, 1925	96½	97½
Pacific Gas & Elec. Co.	First & Ref. 7s	Dec. 1, 1940	98	99
Cal. Gas & Elec. Corp.	Unif. & Ref. 5s	Nov. 1, 1937	86¼	87
Peoples' Gas Lt. & Coke Co.	Refunding 5s	Sept. 1, 1947	73½	74
Chicago Gas Lt. & Coke Co.	First 5s	July 1, 1937	75	77
Portland Gas & Coke Co.	First & Ref. 5s	Jan. 1, 1940	74	77
Seattle Lighting Co.	Refunding 5s	Oct. 1, 1949	65	68
Southern California Gas Co.	First 6s	Nov. 1, 1950	83½	86
United Gas Improvement Co.	Two Year 8s	Feb. 1, 1923	98	98¾
Utica Gas & Electric Co.	Ref. & Ext. 5s	July 1, 1957	77	79
Washington Gas Light Co.	General 5s	Nov. 1, 1960	78	79
Western States Gas & Elec. Co. of California	First & Ref. 5s	June 1, 1941	74½	76

Santa Maria Co. Statement

The following report of the earnings of the Santa Maria Gas & Power Company for the first half of 1920 is contained in the report of the Railroad Commission.

The Santa Maria Gas & Power Company operating in Santa Maria, reports to the Railroad Commission for the six months ending June 30, 1920, that its operating revenue was $67,458.86; operating expenses $15,204.83 giving a net operating revenue of $22,253.80. Miscellaneous non-operating revenue amounted to $5,210.52. Interest, rent and other deductions totaled $4,229.35. The net corporate income for the term was $23,234.97. The surplus at the beginning of the year amounted to $109,910.88. Miscellaneous additions to surplus for 1920 amounted to $285.72 and miscellaneous deductions were $9,791.47. The accumulated surplus at the end of June 30, 1920, amounted to $123,640.10.

Seeks Increased Rate

Little Rock, Ark.—The Arkansas Railroad Commission May 4 set June 14 as the date for a reopening of the case of the Arkansas Natural Gas Company, which is seeking increased rates for gas used industrially. The case originally was set before the Arkansas Corporation Commission but was suspended when the recent Legislature abolished the Corporation Commission, retaining jurisdiction in such cases to the municipalities concerned. The gas rate case will be taken up by the Railroad Commission through a special act of the Legislature, authorizing continuance of the case before this commission.

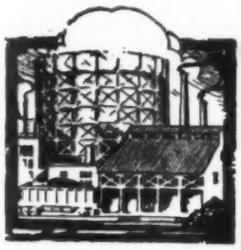
Raised Gas to 55 Cents

Batavia, N. Y.—Gas bills sent out by the Republic Light, Heat & Power Company on May 1 for April, charged half the gas at the old rate of 35 cents a thousand and half at the new rate, 55 cents. As the reading of meters started on April 11 it is figured by the company that the consumers profited by the plan. Hereafter all the gas will be billed at the new rate.

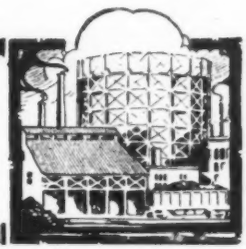
Crittenden Wins Suit

San Francisco, Cal.—A decision upholding a contract in which William C. Crittenden, attorney, is named to receive $67,000 and 6 per cent interest for his interest in the Oregon Gas & Electric Company of Medford, Ore., from Wilbur E. Boardman, capitalist, was handed down May 2 by the district court of appeal. Boardman had claimed that the contract was obtained through "fraud, duress and menace."

The contract was obtained, according to Crittenden's action, after he had invested in the company on Boardman's representation that it was worth between $67,000 and $80,000 and induced Boardman to sign the contract. Boardman attacked the contract in the courts, the action being first heard in Alameda County, where Crittenden also was upheld. Boardman is now in Europe.



NEWS OF THE GAS INDUSTRY



Brown Resigns as Manager of Huron Light & Power Co.

Huron, S. D.—It was announced recently that F. D. Brown, for eight years manager of the Huron Light & Power Company, has resigned his position and will enter the general engineering field, with headquarters at Huron. Mr. Brown will be succeeded, as manager of the power company, by J. A. Ward of Chicago, who has assumed his duties here to-day.

Mr. Brown came to Huron eight years ago from Aberdeen and while head of the Huron Light & Power Company has made rapid strides toward improvement of the service. He is well known and liked by the business men of the city, having an excellent standing in the community. His reputation as a diligent and tireless worker has been rigidly upheld through many difficulties connected with his work of managing and maintaining a light, power and gas service for the city. Many service obstacles have been insurmountable, due to unavoidable plant troubles.

Mr. Brown intends, he announced, to open an engineering office here. He will undertake general engineering work, including consultation, estimates, appraisals and so forth. His experience and training has especially fitted him for success in this venture. He declared that he believed the central location and prominence of Huron will naturally designate this city as the center for such work. He expects to open offices here in the very near future.

Before taking up his work with the Huron Light and Power Company, Mr. Brown completed a three-year period as head of the Aberdeen Street Railway Company, operating that project in a highly satisfactory manner. He planned and constructed the Aberdeen street railway and assumed his duties as head at its completion.

He graduated from Cornell University, Ithaca, N. Y., in 1902, having completed a course and received his degree in mechanical and electrical engineering. Shortly after his graduation he accepted a position with the Twin City Rapid Transit Company and remained with that concern for eight years.

Many Improvements Made

Nebraska City, Neb.—During the past few months the Nebraska City Gas Company has been making a number of improvements in its plant. The company has just completed the erection of coal sheds in which to store a large amount of coal, which cost something like $800.

The company has installed a large number of sectional retorts or bents in which to double the capacity for gas making. The retorts are of the latest pattern and can be replaced easily without disturbing all in that section, as in the old way of doing things, and it will allow the maintenance of a greater number of bents in which there are from four to six retorts. This improvement alone has cost over $1,000. The company has been making other improvements, so the plant is at its best and can be kept that way for several years with but little expense. This means the company is at a point where it can give better service than ever before and to ten times the number of people it has served in the past. This will be good news to the many patrons of the plant and the citizens in general. Manager Dunn has kept the promises, with the head officials of the company assisting, in everything that has been made to the public, at a time when the company was in bad shape and when it was greatly handicapped both as to fuel and supplies, with a shortage of funds.

Insures Its Employees

Malone, N. Y.—The Malone Light & Power Company has recently put into effect a plan of group insurance whereby any employee who has worked for the company for a period of four months is given an insurance policy for $600, this automatically increasing with the period of service until a maximum of $1,500 is reached, which takes place with ten years of service.

This is all without cost to the employee and is being received with much satisfaction by them. Inasmuch as no examination is required, a good number of employees are getting insurance whose occupation would bar them because of being extra hazardous.

If an employee leaves the service of the company arrangements can be made with the carrier whereby the insurance can be continued by the payment of the premiums by the insured.

Lays New Gas Main

Clinton, Mass.—The Clinton Gas Light Company, Superintendent Robert E. Freel announced, began May 9 the laying of 1,700 ft. of pipe from the corner of High and Water Streets to the corner of Water and Prescott Streets.

The pipe will supplement the service now given by the company in that district, the present four-inch pipe not being removed. There has been complaint of lack of gas pressure in the Cedar Hill and Germantown districts and the laying of this new pipe is expected to remedy that condition.

The company itself has the work in charge and it is expected that about twenty-five laborer were employed.

Demonstrates Gas Appliances

Davis, Cal.—The Pacific Gas & Electric Company has fitted up the Schmeiser building, opposite the Post-office, and has invited the local handlers of gas stoves and other appliances that are of the gas-using nature to have them installed for demonstration purposes.

Mrs. M. B. Carter, an expert in the use of artificial gas, is in charge and will give free demonstrations to any desiring them. Also she will, if requested, go into the homes and see to it that gas stoves, or whatsoever, are properly hooked up. She will be here for two or three months at least.

Will Employ an Expert

Newport, R. I.—Negotiations are under way for the employment by the city of an expert of national reputation to make an investigation of the local gas plant so that the city may be better prepared to present its case before the public utilities commission. The hearings by the commission have been continued on this account, and if the city secures the services of the expert another continuation of about a month will be made. This will be to give the expert time to go over the entire plant and prepare his report.

During the hearing before the public utilities commission both Mayor Mahoney and City Solicitor Sullivan have realized the handicap under which laymen labor when the company's experts begin quoting figures and describing the technical stages. Likewise this handicap was evident when the city officials inspected the plant with members of the commission. The action of various condensers was described and the technical process relative to the manufacture of gas gone into in such detail that the city officials quickly saw they would be without much knowledge unless an expert should be engaged.

Should this expert, whose name is not given out for publication at this time, be engaged he will not only be required to go into the gas situation but will also deal with the question of electric light rates and the trolley system. He has had experience in similar work in many of the larger cities of the country, and was in this city last Monday evening for a conference. His home is in Cleveland, where he designed and operated for a number of years the Cleveland municipal plant.

It is within the range of possibility that the employment of this expert may result in a compromise with the company relative to rates, rather than an extended finish fight before the utilities commission. By this is meant that if the expert after going over the plant can suggest certain improvements which will result in the manufacture at a lower price, and if these suggestions are accepted, the gas rate may be decreased. Thus the city may secure better results through the employment of an expert than through fighting the case before the commission without the benefit of his knowledge.

Another side to the question is that the company might refuse to accept the conclusions of the expert, in which event it will be a question strictly up to the utilities commission to decide, as both the city and the company put in their cases. After the inspection of the plant it is certain that the city will be in a position at least to suggest improvements which will make for better gas at a possibly lower rate.

Mayor Mahoney expects to hear from the Cleveland head of the firm within the next week. He had received a letter from him prior to the conference, in which the experience of the writer was described in the handling of thirty similar cases in various cities. In the meantime the gas situation remains in status quo.

Relative to the investigation of the Newport County Electric Company and its car system, it is said that the consent of the officials would first have to be secured before this expert could conduct his work after finishing with the gas plant, which will be examined first. In the case of the electric company it would be necessary to go over the books as well as the plant itself, while a close investigation will also be made of the entire trolley system.

Wants Temporary Rate

Albany, N. Y.—At the hearing May 4 before the Public Service Commission on the complaint of the city of Utica against the Utica Gas & Electric Company, the company put in some additional statements covering operating costs.

Milo R. Maltbie, representing the city, cross examined W. J. Henderson, expert accountant, and J. H. Galsau, an engineer, who worked on the company's appraisals, regarding details covering the company's fixed capital account.

Towards the close of the hearing Neil F. Towner asked the commission for authority to put into effect a temporary rate, as provided by the new law, the company to give a bond to reimburse all gas consumers any difference between the temporary rate and a reasonable return the commission may decide upon.

The commission took no action on the request.

Commissioner W. R. Pooley, who presided at the hearing, said the case would be put ahead as fast as possible, and that an early determination would be reached by the commission.

The Herkimer Municipal Commission made application to the Public Service Commission for permission to extend its lines into the town of Herkimer and serve customers under a consent granted by the town authorities. The village estimates the cost of the proposed extension at about $1,000, and it states that rates for service prevailing in Herkimer are to prevail in the new territory which it seeks to serve.

Erecting Two Holders

Napoleon, Ohio.—The Ohio Gas, Light & Coke Company has started the work of erecting two modern steel holders for the storage of artificial gas, one at the Bryan works and one at Napoleon.

These holders are to be filled with a reserve supply of gas during the night hours, and the service will be greatly improved during the peak hours of the day by being able to call on this reserve supply of gas to give steady and uninterrupted service.

The holders, costing $20,000 apiece, are quite an imposing sight for one who has never had the good fortune to view a gas-making works at near hand. They are 58 ft. in width, reach to a height 50 ft. in the air, and will store 30,000 cu. ft. of gas. A carload of cement is required to build the foundation for one of these holders, the finished steel tank weighing 110 tons and requiring two tons of rivets to put the plates together. It will take a force of ten men about six weeks to build each holder.

The work of pouring the concrete foundation for the new holders at Bryan has been completed and the steel work is on the ground. The erectors start the work this week of fitting the plates together and erecting the holder a section at a time.

As soon as the Bryan holder is completed the erectors will start on the work of putting up the Napoleon holder, and this should be placed in service by the middle of August.

With these two new holders in use the danger of varying pressure will be entirely eliminated, and when the Bryan and Napoleon gas works are further modernized by the addition of high-pressure tanks, which will double the present number, the gas properties of the Ohio Gas, Light & Coke Company at Montpelier, Bryan, Wauseon, Delta and Napoleon will have reached a state of efficiency second to none in furnishing patrons with a constant, unvarying supply of artificial gas.

Will Hold Hearing on Gas Rates

New York City. — Chairman William A. Prendergast, of the Public Service Commission, has announced that the new board had undertaken a wholesale adjudication of the gas rates charged by practically every gas company in the greater city regardless of whether such rates were fixed in pursuance of court decrees or whether the rates were now subjects of litigation in the State and Federal Courts.

Nineteen big gas corporations were in pursuance of this policy served with a notice to appear before the commission at a meeting in New York on June 16 for the opening of the inquiry.

Most of the big concerns now have actions pending in various courts with regard to gas rates. In these cases the old Public Service Commission was a party defendant and Federal Judge Mayer recently granted orders substituting the new Prendergast commission as a defendant. But this will make no difference in the procedure of the commission, since it was stipulated by the Federal judge that the substitution was not to embarass the commission in any way in carrying out its new powers which authorize it to fix gas rates regardless of statutory rates or rates fixed by other authority.

Several of the big concerns have obtained decrees of settlement in suits to permit an increase. In pursuance of such a decree declaring the 80-cent gas law to be unconstitutional because it is held to be confiscatory, the Brooklyn Union Gas Company recently raised its rate to $1.50 per 1,000 cu. ft.; but this company has been cited along with the others to appear before the commission for an inquiry into the reasonableness of its charges.

The effect of the commission's policy will be to take the actual settlement of all gas rate cases out of the courts and bring them before the State body for adjudication, regardless of the stage which the litigation has reached in the courts. The move has been made by the commission as the result of the additional power given by the new law, which says that the commission may fix rates for gas regardless of rates at present in effect by virtue of statute law or any other authority. Mr. Prendergast, in discussing the matter, said:

"The Public Service Commission has determined to undertake an investigation of the prices for gas charged in New York and its suburban districts.

"This means that there will be an immediate effort to determine the reasonableness of these prices irrespective of whether these rates have been fixed by court decree or under any other authority.

"The commission has power to do this under the act proposed by Governor Miller and now law, and it intends to exercise this power to the fullest extent in the public interest."

Authorization of the procedure was made by the full commission at Albany, when the following order was drawn up and the secretary directed to serve it upon 19 gas companies in New York City:

"Ordered: That a hearing be had by the commission on June 16, 1921, at its branch office, No. 49 Lafayette Street, in the Borough of Manhattan, City of New York, at 10.30 A. M., as to the rates, charges and classifications of service of corporations in furnishing or distributing gas for light, heat or power, in the City of New York and suburban territory, and the acts and regulations of such corporations relating thereto, to the end that the commission shall prescribe just and reasonable rates, charges and classifications to be there in force for the service to be furnished, and the just and reasonable acts and regulations to be done and observed, upon such terms, conditions or safeguards as the commission may prescribe, including, if it appears that the public interest requires it, the authorizing of an immediate temporary change in any prices pending a final determination of the prices to be thereafter charged by any such corporations."

The nineteen companies upon whom notice was served to attend the hearing by representatives were as follows:

Consolidated Gas Company of New York; Astoria Light, Heat & Power Company; New Amsterdam Gas Company, Central Union Gas Company, Standard Gas Light Company of the City of New York, New York Mutual Gas Light Company, Northern Union Gas Company, New York & Queens Gas Company, Brooklyn Union Gas Company, Newtown Gas Company, Flatbush Gas Company, Woodhaven Gas Light Company, Jamaica Gas Light Company, Jamaica Gas Light Company, Richmond Hill and Queens County Gas Light Company, Kings County Lighting Company, Brooklyn Borough Gas Company, New York and Richmond Gas Company, Queens Borough Gas & Electric Company and Bronx Gas & Electric Company.

Under the new law the commission has the power to order immediate suspension of any rate put into effect by the companies or through any other agency, and to fix a temporary rate lower than that at present charged for the period of time necessary to complete a thorough investigation of the subject. The commission can also grant a temporary increase.

In taking hold of the gas situation in this wholesale manner the commission expected to reassert the power of the first Hughes commission by means of the additional authority in the new laws. The old commission never had power to fix a rate in contravention of a statute rate.

Has Twenty-Eight Automatic Controls

With the installation of two additional automatic controls recently ordered from the U. G. I. Contracting Company, of Philadelphia, the Philadelphia Gas Works will have installed a total of twenty-eight of these controls.

Citrus Belt Company Report

The Citrus Belt Gas Company, operating in San Bernardino, Redlands, Corona and Colton, in San Bernardino and Riverside counties, southern California, reports operating revenue for the year 1920 was $150,220.47 and the operating expenses at $173,441.26, leaving a net operating loss of $23,220.79. Miscellaneous non-operating revenue amounted to $256.93. Interest, rent and other deductions totaled $16,240.05. The net corporate loss for the year was $39,203.91. The deficit at the beginning of the year amounted to $61,289.31. Miscellaneous deductions were $3,811.32. The accumulated deficit at the end of the year amounted to $104,304.54.

Additional Automatic Control Installed

Following the success obtained with the first automatic control installed, the New Bedford (Mass.) Gas & Edison Light Company has contracted with the U. G. I. Contracting Company, of Philadelphia, for the installation of an additional automatic control for its present gas apparatus.

Wants Rate Increase to Avoid Crash

Baltimore, Md.—John E. Aldred, chairman of the board of the Gas & Electric Company, in a conference on gas rates with Public Service Commissioners Maloy and Whitman, recently made the following statements:

The Consolidated Gas & Electric Company is headed for the rocks.

Unless increased revenues are obtained immediately the company will break.

The company has borrowed to the very limit of its power, and bankers will not lend it any more money.

Unless it can get more money by an increased rate for gas, the company will have to pass its dividend, and that will put on the 12,000 stockholders in the city the burden users of gas ought justly to bear.

The company is selling gas at less than cost, the revenues of the gas division of the company being less than the operating expenses, and providing nothing for fixed charges and dividends.

The situation can be met by an emergency rate to remain in effect until the commission can complete its investigation. now going on, and hold its hearing on the company's application for a net rate of $1.15 per 1,000 cu. ft

An emergency rate of $1 would meet immediate requirements.

Mr. Aldred came from New York for the meeting. The conference lasted nearly two hours, and at times the discussion became somewhat stormy.

The principal mission of Mr. Aldred was to urge the granting of a temporary rate for gas that will put the finances of the company in such shape that it can go ahead with its financing, of which it must do about $17,000,000 by next fall. He also wanted to urge the commission has announced that it expects to hold the hearing in November.

He wanted the commission to put a temporary rate of $1 in effect immediately and argued that the figures which the company already had submitted would justify such action. He challenged anybody to prove they were not correct. The company was furnishing gas at a loss and could not continue to do so, he said.

When Mr. Maloy suggested that it would not be practicable to grant a temporary rate without an investigation, Mr. Aldred retorted that the investigation had already gone far enough to show that the company needed the money unless the company was to be sent toward the breakers.

"If we were getting high rates and had been doing funny things," said Mr. Aldred, "then I would say you were justified in making an exhaustive examination, but our company has been clean and straight; it has done a great deal for Baltimore. The company is not trying to put anything over on the commission or the public, and I think you can trust its good faith in this matter. I tell you, the company is headed for the rocks and will break unless it can get rates for gas that will show a profit instead of a loss."

Mr Aldred did not have any complaint to make about the commission rejecting its application for a rule that would require new customers to finance extensions. "But," he asked, "how are we going to make extensions? We have no money with which to do it; we cannot borrow another dollar."

Mr. Maloy suggested that the emergency certainly had not arisen over night, but the company had never said a word about it. Instead, the officials had filed applications for little things, temporary expedients.

Mr Aldred admitted that perhaps mistake had been made, but that did not alter the present situation. "We must have money, and have it right away if we are to continue to serve the public with gas and electricity," he said "We are now operating at a loss, and cannot continue to do so."

Bankers, he said, have notified the company that it cannot get any more money unless it increases the equity of the owners of the company, and the company had planned to do that by selling preferred stock.

Mr. Maloy suggested that it was the duty of Mr. Aldred to raise the money needed to tide over the emergency.

"I will not raise another dollar for the company," retorted Mr. Aldred, "because I cannot. I cannot perform miracles I can drop what money I have put in the company and get out, but that's all I can do. If anybody can show us how to raise money I will be glad to let him run the company. We have done all we can. We can't wait until November; by that time we will break unless the rates are increased."

Mr. Aldred said the company needed a rate that would yield an increase of something over $100,000 a month.

After some discussion of figures and what certain rates would yield, Commissioners Maloy and Whitman promised to take the matter of an emergency rate into consideration as soon as Commissioner Harper returns to Baltimore.

Seeks Rate Increase

The Indiana Gas Light Company has petitioned the Public Service Commission of Indiana for authority to increase its gas rates at Noblesville and Tipton from a schedule ranging from $1.64 to $1.40 a thousand cubic feet to a schedule ranging from $2 to $1.50. The present schedule has been in effect since June, 1920. The company buys gas from the Central Indiana Lighting Company. The commission has just authorized the Citizens Gas Supply Company, of Greensburg, Ind., to increase its 31-cent natural gas rate to 55 cents and to charge 75 cents as a monthly minimum.

Remodeling Water Gas Plant

In order to meet the increased requirements of its business, the Rockville-Willimantic (Conn.) Lighting Company is remodeling the water gas apparatus at its plant. The contract for this work has been awarded to the U. G. I. Contracting Company, of Philadelphia.

Lowell Installs Automatic Control

The U. G. I. Contracting Company, of Philadelphia, has received contract from the Lowell (Mass.) Gas Light Company for automatic control to be installed on its 11-ft. apparatus, which previously had been operated by hand.

Ask Gas Investigation

Boston, Mass.—Following a charge by Councilor Watson that the Consolidated Gas Company actually gives the city only 75 per cent of the candle-power charged for street lighting under the existing contracts, the Council has voted unanimously to ask Mayor Peters for an investigation.

To Increase Rate 10 Cents

Providence, R. I.—Charles A. Manchester, president of the Providence Gas Company, served notice on the City Council lighting committee recently that his corporation is going to boost the price of gas another 10 cents per 1,000 cu. ft.

This step was necessary, he said, in order that the company's stockholders might continue to receive their 8 per cent dividend without interruption or reduction.

The proposal to again increase charges is made despite the fact that the public utilities commission has not yet officially authorized an increase already in effect which was made several months ago. At a hearing before the commission Mayor Gainer and City Solicitor Chace appeared to oppose the increase. A member of the utilities commission said recently that the matter is "still under consideration."

Mr. Manchester broke the news of the latest proposed increase at a meeting of the committee at City Hall at which Mayor Gainer was present. The committee accepted the gas company head's offer to let the city go over the corporation's books, and designated Public Service Engineer Eaton to make the examination. The committee will meet next Tuesday to hear Mr. Eaton's report.

Mr. Manchester's announcement did not come as a complete surprise. It was partially forecast a short time ago when the president of the gas company called upon Mayor Gainer at City Hall to ask for a conference in order to "determine the company's policy for the coming year."

At that time Mr. Manchester did not mention the possibility of an increase being asked for, but he did say that no reduction of rates and no raising of the standard would be possible during the year because the company, under present conditions, had been barely able to earn an 8 per cent dividend.

Previously, however, Councilman Frederick S. Reisman, a member of the lighting committee which handles all gas company matters, during the course of some remarks intimated that a request for an increased gas rate would not surprise him.

Little weight was given to the statement at the time, but those who heard it gave it serious consideration following Mr. Manchester's visit to the Mayor.

According to a statement made to the lighting committee by Mr. Manchester, operating conditions improved somewhat over last year in some respect, while in others they are expected to be less favorable.

In calculating costs of operation this year, he said, coal and oil were figured lower, but this was more than offset by increased taxes and the decreased sale of coke, as well as the lowered prices of the product.

Taken on the whole, he expressed the belief that his company would require an increase in the price of gas equal to at least 10 cents per 1,000 cu. ft. in order to maintain its 8 per cent dividend rate.

One fact brought out at the meeting was that Public Service Engineer Eaton has not had access to the books of the Providence Gas Company for many months past.

The increase, if agreed to and allowed to become operative, would bring the net price of gas for the first 10,000 cu. ft. up to $1.35 per thousand, plus a $6 a year service charge, while the gross price would be $1.45 plus the service charge.

Following the conference the committee, through its chairman, Councilman Edward E. Austin, issued this statement:

"Mr. Manchester, of the Providence Gas Company, met the committee on lights, the Mayor and Mr. Eaton. Mr. Manchester gave figures showing the result of operating the gas company for one year under the present rate and standard for gas. He advised that the result of such operating was that the company had just about earned the 8 per cent dividend which, he stated, was exactly what the rate and standard was designed to accomplish.

"He further stated that in calculating costs for the coming year, certain items would be on a lower cost level—coal about $1 per ton less than last year's estimate, and oil about 6 cents per gallon less than last year—but that increased taxes of about $80,000 and the decreased sale of coke and the lower price for the same, estimated at $2 per ton less than last year, offset these figures so greatly that, in his opinion, his company would need an increased income equal to at least 10 cents per thousand feet of gas more than the present rate for gas to earn an 8 per cent dividend.

"He invited the public service engineer and the committee to verify his figures and stated that the books and contracts of the company would be placed at Mr. Eaton's and the committee's disposal.

"After a discussion of the matter the committee decided to accept Mr. Manchester's invitation and have Mr. Eaton examine and verify his figures. The committee decided to meet shortly to discuss the matter further."

Big Record of Gas Case

Scranton, Pa. — Covering 590 closely written typewritten pages, the transcript of oral testimony in the city's case against the Hyde Park Gas Company, taken before the Public Service Commission, was received recently by City Solicitor R. S. Houck and counsel for the gas company.

The transcript is but half of the testimony presented thus far, the biggest part of the city's evidence being in the form of exhibits, seventy-five of which were submitted at the hearing here a month ago. These deal with cost figures and other statistical data prepared by Dr. D. F. Wilcox.

Counsel for the company can file their brief later with the commission, and the city has ten days after the receipt of the brief in which to submit its own book. The commission will then set a date for the argument.

Fixes Rate for Two Years

Baltimore, Md.—By an order effective June 1 and to remain in effect two years, unless earlier modified, and beyond the two-year period until further order, the Public Service Commission has ruled as follows regarding the rates of the Hyattsville Gas & Electric Company:

"That during the period this order remains in effect the maximum price to be charged and collected by the Hyattsville Gas & Electric Company for gas supplied by it shall be $1.85 per 1,000 cu. ft. for the first 10,000 per month and $1.60 per 1,000 cu. ft. for all over 10,000 cu. ft. per month, in addition to which prices shall be charged and collected a service charge of 50 cents per meter per month."

Get Franchise for Natural Gas

Prosser, Wash.—As a result of finding natural gas in several wells in Benton County, Wamba & Sons have applied for and obtained a gas franchise for the city of Prosser. It is stipulated that gas must be delivered within three years.

Gas Supervision in Southern California

Last January southern California, particularly that section of the State immediately surrounding Los Angeles City, experienced the most serious gas shortage in its history. This was due largely to the fact that the rapid growth of Los Angeles City and of the near-by towns and communities was greater than had been anticipated by gas engineers. The gas companies made certain provision for normal development, but when all records for growth were shattered last January the gas companies were unable to meet the emergency.

The California State Railroad Commission, fully aware of the situation, appointed Harry L. Masser, one of its engineers, gas supervisor of southern California. Engineer Masser was placed in charge of the gas distributed in southern California at a time when the crisis was most severe, about Jan. 15. Having been the right-hand man of the commission on matters pertaining to both artificial and natural gas, Mr. Masser was in a position to act effectually.

Masser immediately issued an order cutting down the heat content of the gas served by the Los Angeles Gas & Electric Corporation and the Southern California Gas Company, two of the larger utilities in and around the city of Los Angeles. The mixed gas was lowered from 815 B.t.u. to 760. At the same time many of the less essential industries, large industrial consumers, were either curtailed in their use of natural gas or temporarily dropped from the list. In this way the amount of gas on hand was divided among the domestic consumers and a very bad situation was overcome.

In April, with the winter peak load over, Mr. Masser authorized the above-named utilities to return to the old standard, 815 B.t.u. The large industrial consumers, temporarily curtailed or entirely eliminated from the use of either natural or artificial gas, have been taken back on the mains with the passing of the winter peak period.

During the January gas shortage the order cutting down the heat content of the gas did not affect the Southern Counties Gas Company except to a very slight extent on the Santa Monica Bay section. Outside of this portion of its system, and at Santa Barbara where straight artificial gas is distributed, natural gas is served. During this winter season Southern Counties consumers enjoyed the straight natural gas.

The Los Angeles Gas & Electric Corporation operates a large generating plant and is instal'ing additional equipment which will make it the largest generating plant in the State of California, where artificial gas is generated and mixed with natural gas. This mixture is distributed in Los Angeles City, Pasadena and contiguous territory.

The Southern California Gas Company distributes mixed gas in the following cities: San Fernando, Van Nuys, Lankershim, Glendale and the San Fernando Valley, Beverly Hills, part of the city of Los Angeles, Vernon, Watts, Gardena, Redondo, Hermosa and Manhattan beaches, El Segundo, Torrance, Compton, Norwalk, Downey, Huntington Park and in the extreme eastern section of its system, San Bernardino, Colton, Riverside and adjoining communities.

The Southern Counties Gas Company system covers the following: Orange County cities and communities, Santa Ana, Orange, Anaheim, Fullerton, Placentia, Garden Grove, Brea, El Modena; in the Whittier district, Whittier, La Habra and Montebello; Pomona district, Pomona, Ontario, Upland, Chino, Claremont, La Verne, Covina, San Dimas, Glendora and Azusa; in the Monrovia district, Monrovia, Arcadia, Sierra Madre, South Santa Anita and El Monte; Long Beach district, Long Beach, Seal Beach, San Pedro, Wilmington and contiguous districts; Santa Monica Bay, Santa Monica, Ocean Park, Venice, Culver City, Sawtelle and Palms.

The above are the companies and their respective cities which came under the control of Mr. Masser last January. Although the gas shortage danger has passed, Mr. Masser is still to act in the capacity of gas supervisor for southern California, with the view of having the situation well in hand for the 1921-1922 winter peak season, should the history of the past winter repeat itself.

Leach Heads National Stove Association

Taunton, Mass.—Robert M. Leach, treasurer of the Weir Stove Company of this city, was signally honored by his fellow stove manufacturers of the United States when at the recent annual convention he was elected president of the National Association of Stove Manufacturers. This is the first time that this honor has come to Taunton, and not since 1903 has it come to New England, when Albert N. Parlin, of Boston, concluded a term which had begun in 1901.

The National Association comprises stove manufacturers from all over the country; from the Pacific to the Atlantic. There are over two hundred concerns represented, and the Taunton concerns at the convention were nearly all represented and all were deeply interested in Mr. Leach's candidacy and were the first to congratulate him on his success.

Mr. Leach has been giving service previously as vice-president of the organization. He has been deeply interested in its work and has given a great deal of personal attention to matters in which the welfare of the stove trade as a whole all over the United States was interested, and his election to head the organization comes as a merited recognition of his ability and energy.

His local fellow manufacturers look upon his election as reflecting credit to the city and to New England, and emphasizing the preeminence of Taunton as the stove center of the East.

Rate Increases Granted

Trenton, N. J.—Decisions have been handed down by the new board of public utility commissioners authorizing increased rates by the Ocean County Gas Company and the Tuckerton Gas Company, which purchases gas from the Ocean County Gas Company.

In place of the present rate of $1.70 the commission granted the Ocean County company permission to charge $2.25 per 1,000 cu. ft., with a monthly service charge of 25 cents to domestic customers, and a rate of $1.90 for gas sold to the Tuckerton company.

The board authorized the Tuckerton company to increase its $2 rate to $2.40, with a 25-cent service charge to domestic customers.